OBERLIN COLLEGE LIBRARY

The Journal of the
American Medical Association

VOL. XIX. CHICAGO, AUGUST 20, 1892. No. 8.

ORIGINAL ARTICLES.

THE MANAGEMENT OF GANGRENOUS HERNIA, WITH REPORT OF A CASE.

Read in the Section of Surgery and Anatomy, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY JOSEPH RANSOHOFF, M.D.,
OF CINCINNATI, O.

(*Concluded from page 198.*)

When gangrene involves the entire knuckle strangulated the appearances are sufficiently characteristic. Chocolate or dark slate colored, denuded in patches of its peritoneum and in a collapsed condition, it fails to react to mechanical or chemical irritation. The odor is fetid before perforation has taken place. Where the strangulation has been very acute, as in the last case reported, the changes in and about the hernial sac need not be very marked. After the escape of a varying amount of turbid bloody fluid from the sac, the latter appears of a bright or dusky-red minus the glistening appearance of the normal serosa. When it is of older date one after another of the hernial coverings are involved in the inflammation. They are welded together, in turn to break down. A fecal abscess is the result. In the recent strangulation no difficulty is encountered in bringing the intestine into the wound after division of the ring. In that of four or five days, adhesions make this the most delicate part of the operation. It is here that the lesions most difficult to deal with are found, and which, with or without operation, are the most frequent death-causing factors.

The most serious and far-reaching changes in gangreneous hernia are often found in the afferent portion. They may be said to involve its calibre, its nutrition, its contents and the peritoneum singly or together. Although long recognized, the dangers inherent in this part of the intestine have recently been strongly brought forward by Beneke. Above the constriction there is always some dilatation with more or less paresis and congestion of the intestinal wall. It may be darker in color and œdematous from venous stasis. Possibly from the same cause its mucus lining secretes abnormally and as a result at times enormous accumulations of fluid are found. According to Mikulicz from one to three quarts. This forms an excellent culture medium for bacteria and in the process of putrescence toxines are formed, the absorption of which doubtless accounts for many deaths under the mask of acute sepsis from strangulated hernia before peritonitis has developed. The disintegration of this fluid gives rise to a fecal odor irrespective of the site of the constriction, and it is this fluid forced into the stomach and thence regurgitated that is so often mistaken for fecal vomit. (Mikulicz.) Furthermore the wall of a paretic and congested gut has no power to resist the pathogenic organisms which it encloses. Far above the constriction hæmorrhagic infiltrations, diphtheritic-like deposits on or ulceration of the mucus membrane may ensue. This is far more liable to such necrotic changes than the outer tunics and there is no way of knowing how far the process has extended. In one of Kocher's[15] cases the gangrene extended four inches and in one of Taendlers[16] six inches above the suture line. In a case not submitted to operation the diphtheritic deposits were found six feet above the constriction.

When death follows hernia, the symptoms of peritonitis are rarely absent. In the majority of cases, even of gangrene, there is no perforation within the the abdomen, and the course of the peritoneal infection must have been through the macroscopically intact gut. That it may occur where the gut does not enter into the hernia has already been seen (Case 1). It has long been known through Nepven's[17] investigations that the fluid transudate in a hernial sac is rich in pyogenic organisms before gangrene has developed. Boenveken[18] has recently shown that the bacteria readily pass through the wall of the paretic bowel and produce peritoneal infection. On microscopic sections he was enabled to trace their progress through the intestinal wall. From these metastatic infection in remote organs may ensue. The process is like that seen in other morbid conditions of the intestine; notably in typhoid fever and appendicitis, where peritonitis develops without actual perforation.

Equally important with the local, is the general condition of the subject of a strangulated hernia in determining the plan of procedure. When delay has brought the patient to the verge of collapse, when even the shock from prolonged anæsthesia cannot be ventured, *that* must be done which most readily gives relief to the strangulation. It may be the opening of a fecal abscess, the division of the stricture, or the rapid fixation of the gut in the wound. Whatever the procedure adopted in the condition indicated, the result will probably be the same—death within a few hours or days.

In most cases, however, the condition is less deplorable, and evidently tolerant of a somewhat prolonged operation. It is in this class that choice must be made between the establishment of an artificial anus and resection of the bowel, with immediate suture of the divided ends.

Unfortunately, authorities are not to be relied on, for they are divided. In England, Baker, MacCormac, Banks and Treves decidedly oppose the greater operation of resection. In this country the same opinions have been held, unless they have been recently influenced by the reports of successful cases of excision by McCosh,[19] Richardson,[20] Dawborn[21] and others. In Germany, Kocher's and Czerny's first

successes were followed by many failures, which frustrated the natural desire of surgeons to make primary excision the normal procedure in gangrenous hernia. Finally, Reichel's[22] critical review of the statistics in 1883 made it appear that the preferable primary operation was enterostomy, to be followed by a second operation for the closure of the preternatural opening. From the very first Kocher has remained steadfast to the ideal operation, and in Mickulicz he has recently found a most able supporter.

The advantages and disadvantages of the two procedures are almost apparent. If primary resection is successful, the patient is well in from four to six weeks. If an artificial anus is established, a second operation of very serious nature must follow. The artificial orifice is as large as the bowel, and the mucous membrane is prone to prolapse. Such an opening never closes spontaneously.

While in a considerable number of cases the enterotome of Dupuytren might be successfully applied with the low mortality of 5 per cent. (Korte),[23] it will fail in many cases, and be absolutely inapplicable in others. Again, according to Dupuytren, it should not be used until two or three months after the primary operation. It is during this interval that the very greatest danger from the artificial anus is encountered, that from progressive inanition. Recently Poulsen[24] has used it twelve and even nine days after the first operation.

It has not yet been established how much of the intestinal canal is essential to the maintenance of nutrition, but wnere the fistula is above the mid part of the ilium, rapid emaciation and death follow before any secondary procedure for closing it can be practiced. McCosh does not overrate the argument of statistics in the statement that the death-rate of all cases in which an artificial anus is made, including the operations for its relief, is 50 per cent. The danger from secondary resection and enterorrhaphy is very considerable. Haenel mentions 43 cases, with 16 deaths and 2 failures.

To be successful the artificial anus must be established in healthy bowel, else the dangers inherent in the afferent portion will not be removed, nor will a free outflow from the intestine be secured. The only advantages, therefore, which can be claimed for this method, are the rapidity with which it can be performed and the slight technical skill required in its performance. A further advantage is supposed to exist in the lesser danger connected with this as compared with the major procedure of immediate resection.

There is hardly a subject in surgery concerning which statistics are so much at variance as are those relating to gangrenous hernia. According to Korte, of 111 cases treated by enterostomy, 11 ended fatally. Herman (quoted by Haenel) mentions 83 cases, with 7 deaths. On the other hand, Weil[25] reports 15 cases, with 13 deaths. Benno Schmidt places the mortality at 85.5 per cent. for the formation of an artificial anus, as against 71.1 per cent. for primary resection.

F. A. Southern, surgeon to the Manchester Royal Infirmary, recently reports 85 cases of herniotomy, with 9 cases of gangrene. All of the latter died. In 6 an artificial anus was made; in 5 primary excision

If statistics are of any value in solving the relative merits of enterostomy and primary excision, it is evident that the reports of scattered cases are far less weighty than such from a few and skilled operators, and from hospital records where nothing is concealed. Such a tabulation has recently been made by Mickulicz[26] from seven large clinics of Germany and Switzerland. Of 168 cases of gangrenous hernia, 109 died. Of 94 in which an artificial anus was made, 72 died; mortality 76.6 per cent. Of 68 primary excisions, 32, or 47.1 per cent., died. Of 6 intermediary resections, 5 died. It would appear from this that the mortality of primary excision is very much less than that of the lesser operation. But this can be accounted for by the certainty that the latter was often used as a last measure in conditions approaching collapse and therefore precluding the major operation.

The advantages of the primary operation are patent. Its disadvantages are in the time required for its performance and in the danger of peritonitis from imperfect technique. In a measure both can be overcome. The first of these is probably grossly exaggerated. With separation of the mesentery as indicated in the fourth case, and its closure by suture, to be followed by the continuous Lembert suture or by lateral anastomosis, not more than half an hour at most should be required for the enterorrhaphy. Complicated clamps, a separate row of stitches for mucous and serous tunics, interrupted sutures, unnecessarily waste time. Where the continuous suture is used and appears weak at points, a few supplementary stitches can easily be taken. Suturing the mesentery brings the intestinal ends naturally together, and gives assurance that the most treacherous part of the suture, that near the mesentery, can be properly applied. The second danger is from injudicious selection of the lines for suture. As elsewhere in gangrenous processes, the danger lies rather in removing too little than too much. If Kocher excised five and Koberle six feet of intestine, a few inches more or less cannot be important. In acute cases where the calibre of the gut has not been long occluded, and kerporostasis is little if at all developed, an inch or two on each side of the constriction groove will probably bring the suture line in healthy tissue. Where the mesentery has not been included in the strangulation the same favorable conditions may be expected. Where, however, much dilatation of the afferent gut exists, its thorough evacuation should precede the enterorrhaphy. After hernia as after laparotomy for obstruction, it is fatal to return a distended gut to the abdomen. The second danger, that of septic infection of the peritoneum, can in a large measure be reduced by thorough irrigation of the sac before suturing; by careful handling of the gangrenous gut without the wound, meanwhile protecting the peritoneum by gauze packing. Finally, the sutured intestine should be left just within the abdominal cavity and a radical cure should not be attempted. Mickulicz, whose success surpasses that of any other operator, 21 cases with 14 recoveries, insists on the open treatment of these cases. Should fecal extravasation ensue from defective suture or other cause, it would naturally turn toward the wound, whereby the danger of general peritonitis would be largely averted. For from two to five days after the operation the sutured intestine remains where it is placed within the abdomen, and after that length of time the development of peritonitis is not probable. To hasten the process of wound repair, deep and superficial sutures might be drawn through the wound margins and kept over the gauze packing, to be tight-

ened without anæsthesia after the danger line has been passed.

Between the extreme measures considered, others looking towards a compromise have recently been brought forward by a number of surgeons. Among these are the intermediary excision and suture of Riedel.[27] The artificial anus is established in the usual way. After twenty-four or forty-eight hours the edges of the intestines are vivified and united by suture.

In 1882 Bourlly[28] suggested excision and suture, the latter being purposely made imperfect at one point to guide fecal extravasation. To avert the danger from imperfect suture, Hahn[29] follows the kelotomy with a median laparotomy. Through this wound he brings the divided ends of the bowel, thoroughly protecting the abdomen against infection by packing them in gauze. When the suture is completed, the closed knuckle is kept in the wound on gauze splints until union is assured. The competency of the suture is certain after twenty-four hours, when the bowel is returned to the abdomen and the external wound closed. It is difficult to understand why the same procedure could not be carried out in the inguinal herniotomy wound. Nevertheless Hahn has had two successes with it, and in a third reported by Kutschera[30] the result was equally satisfactory.

To overcome the danger of death from inanition, Helferich[31] has recently combined enterostomy with an intestinal anastomosis above the constriction furrows. By this method two courses are open to the intestinal circulation, and the closure of the artificial anus is greatly facilitated. The operation was done in two cases, one of which was successful, the fecal fistula closing spontaneously.

There is yet another class of cases in which the condition of the bowel is such that whereas gangrene is not yet present, it might through subsequent necrosis cause death, if returned to the abdomen. Such a knuckle is a menace. Who has not seen it; especially if operating by light both artificial and bad? Bowel that is not at all doubtful in appearance will at times repay the trust placed in it by a perforation. Among 96 deaths after herniotomy, it was in 26 cases the result of returning intestine to the abdomen which subsequently perforated. In Hagedorn's clinic three deaths out of fifteen resulted in the same way. To return doubtful intestine is unnecessarily jeopardizing life. To treat such intestine as radically as bowel already gangrenous, is an extreme measure not to be advocated. Fortunately, the intestine can be retained in the wound for a number of days by gauze packing or by sutures. When its viability has been established it is an easy matter to return it to the abdomen. Graefe[32] recently reported a successful case in which the intestine was so retained for five days before replacing it. Should the dread of adhesions be feared, the intestine might be retained just within the abdomen by fixation sutures or by gauze. In the event of gangrene the fecal extravasation would course towards the external wound.

When, in 1880, Czerny reported his first case of primary excision for gangrene, he believed that the operation would not displace the older operation of enterostomy. Although the last four years have brought forward success after success from primary resection, the dictum of Czerny still holds good. Each operation has its proper field. The boundary lines are becoming more clearly defined. Nevertheless, it must always remain for the judgment and tact of the surgeon, as individual cases arise, to determine the proper procedure to be adopted. In operative surgery as elsewhere, the ideal should be sought. This would make primary excision, the normal procedure in gangrenous hernia, and only cogent reasons should cause the operator to refrain from striving for the ideal.

Dr. Marey, of Boston, opened the discussion by complimenting Dr. Ransohoff. Sometimes he thought we had too many operators, or rather too many attempting to operate who had not had the proper training. It is part of every physician's duty to know how to operate on a strangulated hernia. The inguinal hernia in the male is the most difficult class of hernia to cure. We have an opening that must necessarily be patent in every healthy man, and the wonder is that every male has not a hernia. Three centuries ago these herniæ were cured by sacrificing the testicle. Dr. Marey described the different methods of radical cure, and emphasized the advantage of bringing the skin together by means of buried sutures so that not a vestige of a stitich is in sight. This stitch is very simple, but he had had great difficulty in teaching it to his professional brethren. By its use we avoid drainage and are able to seal the wound with iodoform gauze, and we may rest assured that if the wound is aseptic it will remain so, and patients are often up on the second or third day. The youngest child he had operated on by the sealing method was two months old, and of twenty operations 90 per cent. have remained cured. In femoral hernia most cases are cured by opening, stuffing and allowing to granulate. He had never operated on a case that was not cured. The only danger is the puncturing of the femoral vein, but that is the first thing that should be looked for. In umbilical hernia the whole sac should be removed, the danger then being from the thin walls in the neighborhood, which can, however, be reinforced. The chief points in the treatment of hernia are: aseptic or antiseptic surgery, the use of antiseptic sutures that can be left buried, and the wound so treated that it can remain closed and no dressing be employed.

REFERENCES.

15 Kocher, Centrlbl. f. Chir., 1889, p. 466.
16 Madelung, Arch. f. Klin. Chir., Vol. 37, p. 287.
17 Nepveu, Gaz. Med. de Paris, 8, 4, 4, 75.
18 Virchow's Archiv., Vol. 120, p. 7.
19 McCosh, N. Y. Med. Jour., Vol. 49, p. 281.
20 Loc. citat.
21 New Y. Med. Record, 89, p. 428.
22 Paul Reichel, "Die Circuläre Darmnaht," Zeitsch. f. Chir., Vol. 19, p. 220.
23 Körte, Berl. Klin. Wochensch., 83, p. 797.
24 Poulsen, loc. citat.
25 Prag. Med. Wochensch., 1887, p. 81.
26 Berl. Klin. Wochensch., 1890, No. 10.
27 Deutsch. Med. Wochensch., 1883, No. 45.
28 Revue de Chirurgie, 1882, p. 362.
29 Berl. Klin. Wochensch., 1888, No. 26.
30 Wien. Med. Presse, 1888, p. 1911.
31 Arch. f. Klin. Chir., 41, p. 337.
32 D. Zeitsch. f. Chir., 34, p. 82.

A FEW POINTS ON THE MANAGEMENT OF STRANGULATED HERNIA.

BY W. B. DE GARMO, M.D.,

PROFESSOR OF SPECIAL SURGERY (HERNIA) IN N. Y. POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL.

The death rate from strangulated hernia throughout the land, has not diminished as it should have done in the face of modern surgery. Notwithstanding the mass of literature that has been devoted to this subject, and the fact that its importance has been fully recognized, from the earliest times to the present, strangulated hernia remains to-day as in years gone by, the dread of the average practitioner of medicine. Physicians who ordinarily act promptly and in the best interest of their patient, hesitate over strangulated hernia, trying first one thing, and then another, actually "frittering" away valuable time, and thereby sacrificing life.

This hesitation, and fear, not doing the right thing at the right time, perhaps has its origin, first, in the

dread of former years, of touching any thing relating to the peritoneal cavity, and second, to the manner in which most of us were taught the anatomy of the parts.

It is not with the hope of presenting anything particularly new that this paper is brought before the surgical Section of the American Medical Association, but it is to emphasize in as concise a manner as possible, a few cardinal points in the management of strangulated hernia, and to enlist the aid of this Section in breaking up some false ideas retained by physicians as to their course of action with their cases.

With the physician who first sees the case rests the burden of responsibility, and if incompetent to carry out means of relief himself, he should realize that in not promptly placing the case in the hands of a man who can apply them, he is almost criminally indifferent to the welfare and safety of the patient.

When we are called to a patient who has abdominal pain, vomiting and distress, and who has a tumor in one of the regions subject to hernia, with perhaps a history of a swelling formerly reducible, but now not so, there is no difficulty in making a diagnosis of strangulated hernia. We do not always have so clear a picture as this. Local pain, even pain in any part of the abdomen is sometimes entirely wanting.

Three years since I was called in consultation and to operate on a young man attacked five days previously, where four different physicians had been in attendance, and only one had suggested strangulated hernia, because abdominal pain had been absent. When I operated, general peritonitis was well established as the result of a knuckle of gut constricted at the external ring. Here was a young man with a history of hernia, suddenly attacked by extreme depression amounting almost to collapse, with vomiting and with an irreducible swelling in the scrotum, and still his life was sacrificed while the doctors wrangled over the question whether it was an inflamed piece of omentum, an orchitis, or a strangulated hernia.

Pain at the point of constriction is in many cases absent, but general abdominal distress or "colicky" pains in the region of the navel less commonly so—this general distress and the anxious expression of the face should in themselves be sufficient to tell of the serious character of the case and the need of prompt action, especially when we have the added evidence of a hard and irreducible tumor.

All of these symptoms are masked by the hypodermic use of morphia which is usually the first remedy applied by the attending physician—many a sufferer from strangulation being sacrificed by the use of the hypodermic syringe.

I cannot emphazize this danger to strongly. If opiates are used, do not allow them to deceive you into inactivity. The pathological changes are rapidly going forward. Your patient is on an express train whose destination is death, and it is traveling with frightful rapidity.

I look upon shock or collapse as one of the most important symptoms which we ever see in strangulated hernia, and when present, should cause us to act with decision, and promptitude. Many cases of death have been recorded as due to the shock consequent upon operation, which in fact were due to the disease and to the delay in relieving it. This only serves as a lesson to us that we must not allow these patients time to fall into this condition of profound relapse.

Intestinal obstruction has of course an important bearing upon some cases of a mild type, but this does not justify the delay which is in many instances caused by trying to ascertain by the aid of enema, or cathartics, whether such a state of affairs really does exist.

NON-SURGICAL TREATMENT.

In considering non-surgical measures for the relief of the affection under discussion, I will first make a brief review of its medical treatment. Those who follow the literature of the subject for the first time, will be surprised both at the number of remedies, and at the confidence with which they are put forward. One would almost think that the surgical treatment of this trouble would no longer be necessary, did we not observe at the same time that the death rate keeps as high as ever. There is no doubt in my own mind that the medical treatment of these cases does far more harm than good, and that could all drugs be abandoned and the subject treated as a purely surgical one, many lives would thereby be saved. Because a case that has been injected by atropia, morphia or hyoscyamine has afterwards been reduced, this is no evidence that it was due to the effect of the drug.

Those who operate upon these cases can produce an equal, or larger number who, through having tried these vaunted remedies have lost the valuable time that meant death to the patient.

Muscular spasm as a factor in the production of strangulated hernia, and as something that must be overcome in its treatment, no longer holds a prominent place in the surgical mind, and the sooner it is banished from the minds of *medical* men, the better it will be for those who suffer.

The sooner the entire profession realize that it is as purely a mechanical difficulty, as is a piece of beefsteak lodged in the throat of a choking man, the sooner will prompt relief be afforded those who are afflicted. Delicate and vascular parts are forced out through an opening composed of hard, non-elastic fibrous tissue. At first the constriction may be only sufficient to retard the return of venous blood. The resistance of the arteries being greater, the blood is still pumped freely into the parts, while its return by the veins is obstructed. Congestion results, and the constriction tightens until all circulation is shut off, and death of the part results. With this state of affairs existing, why give hyoscyamus atropia, chloral hydrat., or even opiates, except to alleviate the sufferings of the patient while making preparations to do something more rational? Why not do the only right thing at once? that is, cut the constricting band.

EXTERNAL APPLICATIONS.

I shall not stop to discuss the many external applications that have been credited with great power in reducing strangulated hernia. Heat, cold, poultices, croton oil and other liniments, have all had their advocates, and to faith in each, has some life been sacrificed. Evidence is strong, however, in favor of the local application of sulphuric ether—Finkelstein claims to have reduced fifty-four out of fifty-eight cases by this means alone. The hips are elevated, the parts exposed to the air and well anointed with sweet oil, then about a tablespoonful of ether is poured over the tumor every ten or fifteen minutes.

It is supposed that the intense cold produced by rapid evaporation, acts not only upon the engorged blood-vessels, reducing their size, but upon the bowel itself. I believe this to be safer and more efficient than taxis in the hands of the inexperienced. I should feel regarding this, as with the use of ice, that it should only be used in the earlier stages, before the vitality of the part has been impaired, and that it should not be continued over a great period of time.

TAXIS.

Dunglison gives the definition of this word as "the operation of reducing a hernial tumor by the continued pressure of the hand"—but I have found that the interpretation of the term by the profession at large, may be anything from the most gentle manipulation, to the mauling and pommeling of the tumor, or even of putting the patient on the floor and jumping on him, as had actually happened to a man who came under my care a few years ago.

In the manipulations known by the term "taxis" we have a power for good or a power for great evil, and I regret to say that as ordinarily used, the one almost counterbalances the other.

None but the most gentle manipulations should ever be used upon a strangulated gut, or even an incarcerated piece of omentum. This should be done mostly before the patient is etherized; the temptation to resort to "brute force" is too great when the patient is insensible to pain. I desire to give here a method for reducing hernia, that has been followed by me for many years. I claim no special originality, but do claim and know that it is not generally used.

Try at the outset to assure your patient that you are not going to add to his torture, and confirm this in his mind by handling the tumor with the greatest gentleness. By this you will secure his coöperation instead of unconscious resistance. Work the fingers of one hand around the neck of the tumor where it issues from the abdomen, holding its bulk in the palm of the hand if possible, and instead of trying to push this tumor back into the abdomen, *try to draw it further down*. Now with the other hand grasp the canal and its contents (if inguinal hernia), gently but firmly between the thumb and fingers, and while making *traction and compression* with the hand that is holding the tumor, manipulate the canal with a "kneading" motion. This can all be done without adding to the patient's pain to any extent, and it will succeed when ruder handling fails.

When you push upward upon a strangulated hernia, usually you carry it up over the edge of the ring upon the abdominal wall, and accomplish nothing more. In the method suggested, by *traction* you lengthen out the mass that is blockading the canal, favoring the effect which you afterwards produce by *compression*, *i. e.*, the partial emptying of engorged blood-vessels, and the displacement of imprisoned gases and fluids. This is further aided by the action of the fingers upon the canal, which tend to work the bowel free at the point of constriction.

This method applies with slight modification to any form of hernia with which we may meet. In enormous inguinal hernia, the pure rubber bandage may be called to our aid in making compression.

In femoral hernia we have a very short canal to act upon, and I have for this reason modified my manipulations in the following particulars:

The hand for *traction* and *compression* is used as before described, the tumor being drawn in a line at right angles with or directly away from the leg. With the fingers of the other hand, the neck of the tumor is "kneaded," and from time to time the abdominal wall immediately above the hernial opening is gently but firmly pressed deeply into the pelvic cavity, by the ends of the fingers carried just over the brim of the pubes.

This pressure deep into the pelvic cavity, displaces the viscera in the immediate vicinity of the internal hernial opening, and doubtless causes some traction upon the bowel from within.

I can recommend these methods of reducing hernia, with every confidence that those who try them, will find them more satisfactory than the usual way of applying taxis.

ANÆSTHETICS.

I shall mention only one more article under the head of non-surgical treatment, and that is the use of anæsthetics, purely as a means of aiding in the reduction of hernia. Here again we are using a two-edged sword; I have not hesitated to place myself squarely on record, as having no faith in the causative action of muscular spasm, and this means that ether merely allows us to use a force, that we would not dare use during the consciousness of the patient. One point in its favor I am willing to admit, it does away with the unintentional resistance on the part of the patient. I believe that an anæsthetic should always be used, but never by the man who is not prepared to cut down and sever the constricting band, before his patient comes from under its influence, in case he fails to replace the protruding parts, by moderate manipulation.

ASPIRATION.

Aspiration is on the line between the medical and surgical treatment of strangulated hernia. I believe that it is more frequently resorted to by the physician than by the surgeon. It is one of those vain hopes resorted to in order to avoid an operation, and one of the means that puts the patient in greater danger if not successful. The puncture of the bowel by the smallest needle when its vitality is already at the lowest ebb, furnishes a very favorable spot for the beginning of necrotic change, and notwithstanding the fact that they belong to a class of cases not fully published, there are enough on record to show that perforation is more likely to occur at just this point, than any other.

In a few instances where the hernia is incarcerated by its enormous size, rather than strangulated by a constricting band at its neck, it may by affording escape to the imprisoned gas, break up the blockade.

It is by no means an innocent measure to be indiscriminately applied.

WHEN TO OPERATE.

In former years there was some question, as to just when it was justifiable to operate, that is, just how far you were to allow your patient to go towards "death's door" before giving him relief. I regret to say that there are still a fair number of physicians who do not feel any alarm for their patients until fæcal vomiting begins, and believe that it is then quite time enough to talk of surgical measures. They fondly imagine that they are acting in the patient's interests by trying everything else, before the knife.

Then again there are a large number too timid to operate themselves, and not conveniently situated to call a surgeon. To these two causes many lives are sacrificed every year.

I look upon delay as by far the most dangerous feature of the case. In thirty-one cases of strangulated hernia in private practice I have lost three cases, and I am sure that two of those might easily have been saved by an early operation.

This good record is due to two causes—First that I have seen the cases early, and second that I have never left my patient until the hernia was reduced.

OPERATION FOR RELIEF.

Few operations are easier to perform than those done upon a recent case of strangulated hernia, before pathological changes have taken place, and few are more complicated after long delay.

The point of constriction in inguinal hernia, in a large majority of cases, is at or near the external ring, and in femoral it is rarely found deeper than Gimbernats ligament. In reaching these points only the most insignificant vessels are divided. The question of opening the hernial sac should no longer be under debate by those doing aseptic surgery.

Except in the smaller herniæ, recently strangulated, safety is on the side of examining the contents of the sac, and knowing by actual inspection that they are in a fit condition to return to the abdominal cavity.

We cannot without seeing, estimate the amount of damage that may be done to a loop of intestine, even in a very few hours. In femoral hernia, I have seen the gut, black, after only five hours' strangulation, so complete had been the arrest of circulation.

Then again within the sac we may have a piece of omentum which has long been outside of the abdomen, and so changed in character as to make its removal safer, than would be its return within the peritoneal cavity. Such hardened masses of omentum sometimes give rise to peritonitis. More than this, they are a very strong predisposing cause of the recurrence of the hernia.

Amputation of the omentum has long added very seriously to the mortality resulting from these operations, first, from secondary hæmorrhage, and second from sepsis. The common method of surrounding a large piece of this fatty tissue with strong cat gut, and then tying, cutting off, and reducing the stump to the abdomen, is dangerous in the extreme. Rapid absorption takes place, the ligature is loosened, and bleeding into the abdominal cavity results. Nothing short of laparotomy will save the patient.

For several years it has been my habit to spread these omental masses out on the abdomen and tie each vessel separately with small *aseptic silk*. I have placed as many as eighteen silk ligatures upon the omental stump. This method has the double advantage of ensuring safety against hæmorrhage, and also of allowing the omentum to spread out in a natural manner in the interior of the abdomen, instead of being held in one mass, as a convenient wedge to redilate the canal at later date. I sterilize my silk by boiling for twenty minutes in a carbolic solution, and it is then kept in alcohol.

The second risk—sepsis, is no longer a very great one with careful operators.

COMPLICATIONS.

Among the complications met with, none are more frequent than adhesions. These are mostly between protruding omentum and the sides of the sac, and are easily broken down. If, however, they are between the bowel and the sac, great care is sometimes required to separate them. It is far better to cut out that portion of the sac adherent to the gut, and reduce it in this way, than to run any risk of tearing the intestinal coat. Before returning the intestine it should be carefully inspected to see that it is not twisted upon itself, or that its surfaces are not adherent. Treves has shown that those who have suffered from strangulated hernia, are more liable to intestinal obstruction subsequently than other persons, on account of these adhesions lengthening out into bands that entangle the intestine. After reducing the bowel, it is well to introduce the finger and sweep it around the interior of the abdomen, to assure yourself that no adhesions exist in the vicinity of the hernial opening.

It is no uncommon thing, even in cases of short duration, to see the bowel of a dark chocolate color, in which cases, after the stricture is cut, the bowel should be kept outside of the abdomen and hot cloths wrung out of sterilized water applied, until a change towards its normal color is observed.

The use of any form of antiseptic solution upon the damaged bowel is strongly advised against, however. Small perforations may be surrounded by a circular stitch and closed. It is true that this narrows the lumen of the bowel, but a considerable narrowing is safer for the patient than resection. Even when there is sloughing demanding resection, it is believed that an artificial anus should be established until the patient has sufficiently recovered to warrant its closure by a secondary operation.

When in doubt what to do with the bowel the safer plan is to leave it outside of the abdomen, if necessary several days. If great shock exist at the time of the operation, or if general peritonitis is established, it is believed to be good practice to flush the abdominal cavity with sterilized hot water, water as hot as can be borne by the hand or even hotter.

OPERATION FOR CURE.

Having relieved the patient of strangulation, it should be our next consideration to protect him, as far as lies in our power, from a recurrence of the hernia. It is true now, as in all times past, that we have no method of cure for hernia that will not fail in a large number of cases. This is due to the fact that the same inherent defect exists in the structure of the abdominal wall, that acted as the predisposing cause of the original hernia. In many instances we cannot overcome this.

Fortunately we can now resort with impunity, to methods of restoring the parts to their normal condition, that were in former years very hazardous to the patient. This fact is leading to a larger percentage of cures and a greatly reduced mortality rate. There are very few instances when the operation for radical cure cannot follow that for the relief of strangulated hernia, without increased danger to the patient.

It is not within the scope and intent of this paper, to consider the various operations at present in use, and I will only say that during the past four years, I have used the operation of Baker, of London, with great satisfaction. This, briefly, consists of cutting off the sac as near the internal ring as possible and then

stitching up the canal with heavy braided silk. Union by first intention is secured in almost every instance, leaving the deep silk sutures permanently in the canal. Since I have sterilized and prepared my own silk, I have no trouble about the stitches coming out.

The old routine of giving an opiate to keep the bowels quiet after operations for strangulated hernia is believed to be bad practice. Opiates are seldom called for to relieve pain, and should never be given for other reasons.

It is not an uncommon occurrence, that the loop of bowel which has been subjected to constriction, is in a state of temporary paralysis, when it is reduced to the abdominal cavity. Fæces collect at this point, and not only increase the danger of perforation, but if they become hardened may cause intestinal obstruction.

It is believed that the early administration of a mild saline cathartic, not only tends to prevent accidents of this character, but that it relieves the congestion of the bowel more promptly, than if left unaided.

In closing this brief, and necessarily incomplete consideration of a very extensive subject, if I have not shown my belief in the following propositions, then surely I have fallen far short of my desire.

1. That the death rate from strangulated hernia, is unnecessarily excessive.

2. That medicines, and external applications are dangerous, in that their use often results in delay, allowing destructive changes to take place.

3. That the operation for strangulated hernia, *if done early*, is neither a difficult nor a dangerous one, and affords immediate relief, from one of the most distressing and alarming accidents to which mankind is liable.

THE TREATMENT OF COMPOUND FRACTURES.

Read in the Section of Surgery and Anatomy at the forty-third Annual meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY W. H. MYERS, M.D.,
OF FORT WAYNE, IND.

The injuries of bone are classified as: simple fracture, compound fracture, complicated fracture.

What are the indications when called to treat a case of compound fracture?

To arrest the hæmorrhage, as far as possible; to render the wound aseptic, and to prepare to set the fracture.

The second indication: to keep the bones in normal position. The third indication: to conduct the case so as to prevent putrefaction, and to remedy septic infection when it has occurred.

I suppose we all admit the cause of putrefaction to be, the presence of microörganisms which enter the wound from without, and that the putrefactive fermentation of the discharges leads directly to septic infection; hence, any essential part of the treatment of wounds must be to prevent the entrance of these organisms.

To conduct a case so as to prevent the changes referred to we must ever bear in mind that germs are living.

All living things require certain conditions for their growth and development, vitality their poison, non-vitality their food.

We interfere with their growth and development by the use of antiseptics, a successful interference will give us an aseptic wound. The methods of interference may be stated as follows:

1. By removing the germs before they have had time to do harm, by washing out the wound.

2. By removing the soil in which they grow, by free drainage.

3. By rendering the soil inert; this may be done by constitutional treatment, by general and local rest, and by keeping the patient in as perfect health as possible, thus increasing the vitality of the tissues.

4. By preventing the deposit of the germs; this may be done by absolute cleanliness of the hands, instruments, ligatures, and by irrigation.

In support of these statements I shall quote McNamara, who uses the following languge: "I believe that with ordinary care we can prevent putrefaction and suppuration from taking place in cases of compound fracture by Mr. Lister's system of dressing." Also a quotation from Dr. David W. Cheever, of Boston: "The majority of compound fractures now are made aseptic and continue so, healing without amputations, formerly so common."

I now offer in support of the foregoing statements the following statistics:

Mortality of compound fractures during the pre-Listerian period.

Baum in Gottingen lost	38	per cent.
Billroth in Zurich lost	38.7	"
Billroth in Breslau lost	40.5	"
Billroth in Halle lost	40.6	"
Billroth in Bown lost	41.8	"

Under the Listerian treatment Professor Volkmann has 75 cases of compound fracture without a death.

Lister, Volkmann, McEurn, Bardenhuer and MacConnac report 530 affected with 1,072 compound fractures, and of these only three died. In discussing the treatment of compound fractures I shall only refer to immobility of the use of plaster paris, bone-grafting or transplanation with a case, and the question of amputation.

John Hunter said: "The first great requisite for the restoration of injured parts is rest." Complete rest, absolute repose. With a clear apprehension of these great principles, and a minimum of subsequent interference after immediate reduction, a good result will ensue. I have for more than ten years treated compound fractures upon the same principle as I do simple fractures if called early to see the case, and if the blood supply be not so largely interfered with as to cause gangrene. After thoroughly cleansing the entire limb with soap and water, and afterwards using a five per cent. solution of carbolic acid, for the same purpose (anæsthesia with ether), I close up the wound with protective, seldom using sutures, dusting the part with iodoform, also the adjacent skin; I then apply four or five thicknesses of bichloridized gauze and a layer of carbolized cotton, and complete the dressing by plaster paris bandages to give the needful support to the limb. These are applied spirally until every part of the limb and wound are covered by four or five thicknesses. Drainage I do not employ. If the fracture is below the knee I elevate the foot. I allow this dressing to remain fourteen days or even longer, unless thermometric indications present themselves for its removal. I would only then remove the dressing because of the subsidence of the swelling. The advantage of

the dressing is, that the bandage applied in such a soft and pliant state as to accurately adapt itself to the limb affords a firm and even support when the plaster hardens. We thus secure perfectly immobility, muscular spasm is prevented,and with it absence of pain.

Infrequent dressing is a corollary of that fundamental principle of absolute rest during the healing process. This principle is not new, for Bellaste, in 1707 said: "I only dress a wound infrequently,convinced that we must give nature leisure to act in re-establishing wounded parts in their former state." The elder Larrey shows how far he carried the principle of immobility, and how little he cared to examine and dress wounds in soft parts by his treatment in the following case: "This soldier whose arm I amputated at the shoulder joint, during the terrible battle of Moscow, in 1812, at my request set out immediately on his journey homewards, without ever having the stump dressed, in accordance with the assurance that I had given him at his departure that he would not need it."

I assert the ideal wound dressing in a case of compound fracture to be that which affords perfect rest, absence of tension with antiseptic protection. Now contrast a simple with a compound fracture. To the question what is a fracture, Agnew replies: "It is defined to be a solution of continuity in the fibres of a bone." I answer, it is much more than this. Vessels are ruptured, periosteum torn, the sharp and irregular fragments wound the overlying tissues, blood is extravasated, the soft parts contused, and yet, so long as the skin is unbroken,no serious consequences will follow. The simple fracture, so called, if properly adjusted,unites easily and quickly without pain or fever. Why does this not occur in a compound fracture? Why have we fever,pain and extensive suppuration in one and not in the other? It is now proved that these consequences depend upon putrefaction of the wound secretions, and that the putrefaction itself depends upon the presence of minute living particles in the atmosphere. Now, if by the use of germicides we can prevent these changes from occurring as already stated,why not,as a result, the compound fracture heal as a simple fracture. This result I attempted to obtain by the treatment before referred to.

That the roller bandage has been objected to I am well aware. I will refer to two cases that are classical, the one reported by Albucassis, the other by Sir John Bell.

The case of Albucassis, the melancholy story of the black eunuch belonging to one of the princes of Arabia, who having fractured his leg near the ankle-joint,had it bound up very firmly with compresses and above the wound. Strict instructions were given not to undo the rollers; from the stricture of the bandage there came on gangrene of the limb. In 1801 John Bell remonstrated against rollers and referred to a boy having a compound fracture of his arm, he says: "the surgeon to whom I referred the case bandaged the fracture with a roller, and at my morning visit I found the fore-arm bound more firmly than a mendicant's leg, the black skin appeared through the interstices of the roller, and the arm fell into total gangrene." In almost every book on fractures since 1801 we have a graphic description and representation of the gangrenous arm referred to by Bell, and the leg referred to by Albucassis. These cases were the result of constriction and not of compression. It may be well to clearly apprehend the distinction between constriction and compression. The first is hard, sharp and painful, it strangles and destroys, while the latter comforts and repairs, it is elastic, soft and gradual; it soothes an injured part; it conduces to healthy innervation and circulation; prevents inflammatory effusions; promotes absorption and controls muscular contraction. In fact it enables us to turn the blood serum, and what would otherwise be waste substance and a danger to the patient, into materials by means of which the reparative process may be quickly effected in the injured tissues.

Amputation.—The treatment of wounds has undergone such a complete revolution that we are compelled to re-cast the doctrine of amputation in compound fractures. Too many limbs are sacrificed by a too hasty resort to the amputating knife. The "knives-men" are still abroad in the land and I regret to say that many of them are found along our railway lines. These have failed to notice that conservative surgery has been carried to a point formerly deemed impossible. MacCormac says: "The great improvements introduced of late years in the manner of treating the wounds have now rendered it practicable to save many cases—even of the most serious injuries, cases of compound fracture for example, and wounds of joints—from the mutilation which amputation of necessity entails."

Wyeth "The present rapid advance in the science of surgery and the greater perfection in its art declare that the time is not far removed when amputation for other causes than gangrene will be comparatively rare."

A surgeon should always remember in deciding whether amputation shall or shall not be performed that upon his decision depends the future of the patient, whether he shall be a comparatively helpless cripple or perhaps be sentenced, himself and family, to pauperism, deprived of the enjoyment and comfort of the performance of those movements which are held in estimation only second to life itself.

DR. GEORGE K. JOHNSON,
Surgeon-in-Chief, G. R. & I. R. R. Co.,
Grand Rapids, Mich.

Dear Sir:—I herein report the case of Paul Ribble, employed on the G. R. & I. Railway. He was injured on the 26th of May, 1890. The car being loaded with heavy lumber, the brake being defective, would not catch, and when the car upon which he was collided with the forward part of the train, the lumber slid forward, a board catching his leg and forcing it against the brake-staff, producing a compound comminuted fracture of the left leg; the tibia was comminuted, and the fibula sustained a fracture. He was conveyed to the St. Joseph Hospital, and placed under the influence of ether while his leg was dressed. The tibia was carried away for the space of 2½ inches; the upper and lower ends presented the condition known as dentated. Passing my finger deep down in the wound, I found pieces of the tibia entirely detached from the periosteum. These pieces (four in number) I removed; one large piece 2½ inches long, spear-shaped at both ends, and three smaller pieces. After placing them in a basin containing a warm solution of carbolized water, the limb being carefully cleansed and placed in its normal position, while firmly held, I placed the bones as nearly as possible where they belonged. I dusted the part with iodoform, placed protective over it, then a sheet of carbolized cotton, and over this six or eight layers of bichloridized gauze; over this a thin bandage to retain everything in place. I now proceeded to place over all the immovable dressing, using for the purpose a plaster of Paris bandage; this hardened in thirty minutes.

The dressing was allowed to remain twenty-eight days without interference. During this period the pulse remained 75,—never varying, and the temperature at no time deviated from 98.5°; sleeping well, free from pain, appetite good, cheerful and contented during all this period.

June 23, at 2 P.M., I proceeded to remove the dressing, cautiously avoiding all unnecessary movement. The wound was healthy, not one drop of pus; granulation had extended over all the replaced pieces of bone, except one small fragment, which presented a white surface. Union had progressed so far that the fibula was intact, and the tibia, at the point of fracture, was firm beyond my expectation; no swelling nor abscess presented itself; the largest piece of bone had disappeared beneath the granulating surface.

July 7, 1890, I removed the dressing for a second time. I found the wound in the soft parts filled up and firm union of the bone, the replaced pieces remaining, but still somewhat visible. The smaller piece visible at the first dressing much lessened, and the larger piece disappeared; no pus nor abscess present.

I may add the piece of bone next largest in size was not entirely covered by granulations.

Pulse and temperature normal, appetite excellent, sleep undisturbed. The patient's condition all that could be desired: so far not one untoward symptom has presented itself.

Dr. Ricketts, of Cincinnati, said he had read two papers in which he took the ground that in cases of doubtful fractures the surgeon had the right to make the exploratory incision. If, in a case of compound fracture, we can return the dislodged bone and have union, there is no reason why, if there be two or three fragments, the surgeon should not cut down and wire them together. If we are clean there is hardly any limit to what we can do. He was glad to know that Dr. Myers did not use wire in his case, but he thought that in the majority of cases silver wire should be used to hold the pieces in position. The question of operation is a difficult one in railway surgery, where the medico-legal considerations are so great.

Dr. Edwin Ricketts had heard some surgeons say that the bones will not unite if the periosteum is not in place. He could not understand why this should be, if in abdominal surgery portions of the peritoneum are taken off and nothing thought of it.

Dr. North, of Michigan, said he had seen a great deal of railroad surgery, and he strongly advised against the use of the knife if it can be avoided, even if the products of ulceration flow out of the wound. Even a year afterwards an operation can be successfully performed, if necessary.

Dr. Ricketts, of Cincinnati, added that in operation on the skull, the button of bone is returned without the periosteum, and union takes place.

Dr. Griffith stated that he had used decalcified chips of bone and had bone develop from them, and he did not think the periosteum was necessary.

Dr. McCaul, of Michigan, reported a case of trephining in which he returned the button without the periosteum, and the wound is perfectly sealed to-day.

Dr. Emmett, of Iowa, thought there was no longer any question as to bone grafts growing. He had seen cases in which Senn's decalcified bone grafts were used with perfect success.

The chairman, Dr. Gaston, stated that his observations in this line confirmed the views to which he had just listened. He related a case of extensive suppuration along the tibia, denuding two-thirds of the anterior part of the bone of its periosteum. Amputation was proposed, but it was decided to wait, and to-day the case promises complete recovery.

Dr. Emmett related a case of which he had read, in which a patient with a seriously injured foot was advised to have it amputated, but refused. Gangrene set in and the leg had ultimately to be amputated above the knee. The man sued the physician for damages, on the ground that it was the physician's duty to use his own judgment. He won the suit and the Supreme Court sustained the decision, saying that the surgeon was liable for damages, as the patient could not be supposed to know whether amputation is necessary or not.

Dr. North inquired as to the course to pursue if, in spite of every treatment, non-union continues.

Dr. Duffield, of Detroit, stated that if the Supreme Court of the State of New York decides that a patient can say that he will not have his limb amputated, and then holds the surgeon responsible for not operating, the surgeon occupies a peculiar position. He had always contended that the patient should decide. The best way is to call counsel, tell the patient their decision, and if he refuses to abide by it, let him get another surgeon.

Dr. Ricketts, of Cincinnati, replying to Dr. North, stated that mercuric chloride in large doses internally would cause union of the bone.

Dr. Myers said that he has had good results from sawing off the extremities of the bone and nailing them together. He had seen Mr. MacEwen, of Glasgow, after trephining, break up the button into small fragments and replace them. He thought it would always be better to replace any fragments removed, and recalled a case of trephining in which he did not replace the bone, and now, eight years after, there is a concave surface which is making pressure, as is shown by commencing paralysis.

Dr. Ridlon, of Chicago, speaking of non-union, referred to two cases of compound fracture in which non-union persisted in spite of all the numerous plans tried. His plan was to put the limb in position and hold it there, preventing motion laterally and longitudinally, and then constrict the limb above the point of injury by a band, producing œdema about the injured part. The legs were allowed to hang down, and in both cases union was perfectly solid. Eighteen months and a year respectively elapsed between the injury and this treatment. Thomas reported forty cases so treated successfully.

Dr. Milton, of New York, related a case of non-union cured by the patient being allowed to use the leg.

Dr. Graves, of Michigan, thought that cases of non-union were really cases of delayed union. He had seen many cases in which the bones took months to unite.

Dr. Smith, of Michigan, believed that the upright position, together with getting the patient out into the fresh air, materially helped cases of non-union.

The Chairman reported a case of non-union cured by forcibly rubbing the ends of the bone together so as to excite inflammatory action.

GUNSHOT WOUNDS OF THE BRAIN.

Read in the Section of Surgery and Anatomy, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June 8, 1892.

BY C. E. RUTH, M.D.,

OF KEOKUK, IOWA.

Gunshot wounds of the brain have always been considered almost of necessity fatal, and when we review the surgical history of our late war and find among hundreds of brain wounds, that not more than ten cases made partial or complete recovery, we need not be surprised to find the general concensus of medical opinion to the effect that nothing could be done in those cases but to make the patient as comfortable as possible, while the fatal result was confidently awaited.

Less than ten years ago, I have heard leading surgeons stand before medical classes and say, when a missile has entered a cavity, never explore for it. None would think of following that advice in regard to the abdomen to-day. We may not hope to accomplish in gunshot wounds of the cerebrum, as much as has been or can be accomplished in abdominal gunshot wounds. Yet I think there is evidence to prove that cases in which missiles have entered or passed through the brain, are not necessarily so hopeless as has been believed. Many do not die immediately, and when they do not, they are entitled to as much consideration and effort to spare their lives as for other grave injuries.

All our standard authorities on surgery, which I have seen, except two, Wyeth and Treves, agree that we are not justified in attempting to follow a ball that has entered the brain. That its track can not be followed without doing more damage to the brain than the missile would do if left alone. That the finding of a ball that has entered the brain is simply a piece of surgical good fortune or accident, and not due to the operator's diagnostic or operative ability.

The advance ground that Wyeth and Treves take seems to be based wholly on the case of Fluhrer, in Bellevue Hospital, in 1884, in which he followed the track of a ball some distance into the brain and removed a trephine disc from the opposite side of the head from the point of entrance, at a point slightly below the spot he expected the ball to have struck, and found the ball imbedded in cerebral tissue and removed it.

Case 1.—March the 3rd, 1891, I was called by Dr. F. L. Darrow, to see E. C., aged eighteen, who had been shot sixteen hours before by a thirty-two calibre pistol at short range. The ball entered at the outer canthus of the right eye, through the frontal process of the malar bone, and passed upward and backward into the brain. From the position of the parties concerned in the shooting, appearance and course of the wound through external soft and osseous tissue, the course of the ball through the brain was towards the opposite parietal eminence. The only symptoms of compression were slight slowing and irregularity of the pulse, which disappeared on the removal of a coagula occluding the wound and discharge of cerebral tissue and fluid blood. Temperature, pupils, motion, sensation and coördination were normal. For two weeks he remained rational, slept and ate well, pain slight. At the end of that time he began to show evidence of septic trouble with pyrexia of moderate degree, followed by anorexia and rapid failure of strength. The wound had not been allowed to close, but not being satisfied that the drainage was as complete as it should be, I carefully introduced a director four inches, and replaced it with a drainage tube. The director did not pass in the direction I had mapped out for it towards the opposite parietal eminence, but at an angle to its line of incidence of about thirty degrees. Noting no improvement in his condition, two days later I introduced a drainage tube six inches without any marked resistence. I did not know how much resistence a normal brain should offer, but was satisfied that the force I had used was so slight that I was certainly in the track of the ball. Still noting no improvement in his condition, but on the contrary rapid failure, I was satisfied that there was a pus cavity about the ball and determined to go still deeper for drainage purposes, and passed my director, and afterward drainage tube to the skull behind. The case by this time was so desperate that no time was to be lost, as he might apparently die at any time, I determined to try and find the ball. I shaved the occiput, carefully passed a gum director until it was resisted by the skull posteriorally and with a straight edge sighted the projecting end of the director vertically and horizontally, and drew a line across the occiput at right angles to the projecting portion of the straight edge in both positions. The point where the lines crossed I expected to indicate the position under which rested the point of impact of the bullet, and the tip of the director. On removing a half inch disc there was a discharge of pus to the amount of one to one and one-half ounces through a hole in the dura mater made by the impact of the bullet, and the mark of the bullet was plainly shown by a lead deposit on the inner side of the disc.

The center of impact was missed by the center of the trephine disc not more than three-sixteenths of an inch. The disc was removed at the junction of the parietal and occipital bones, one inch to the right of the median line. A drainage tube was passed entirely through the middle and posterior lobes of the brain on the right side and irrigation practiced twice daily with sterilized water and hydrogen peroxide. Appetite improved and pyrexia grew less for four or five days, during which time he was perfectly rational, but the improvement was not maintained and he died from exhaustion ten days after the operation and thirty days after the shooting occurred. The ball was procured at a dressing a couple of days after the operation. The ball being free in the abscess which formed around it made it impossible to procure it at the time of the operation without destroying normal cerebral tissue, or the removal of another trephine disc to procure more room. His condition was not such as to warrant further operative interference at that time. Unfortunately no post-mortem could be obtained.

Case 2.—May 4th, eighteen hundred and ninety-two, was called to see Fred. S., German, aged eighty, who had shot himself about thirty-six hours previously with a thirty-eight calibre pistol. The ball entered one-fourth of an inch to the right of the median line of the frontal bone and one and one-fourth inches above the supra-orbital margin. Bleeding had been profuse but had entirely ceased before I saw him. A few hours after the injury he appeared for a time quite rational and talked some. When seen by me his pulse was one hundred and eight to one hundred and twenty, of fair volume, respirations irregular and semi-comatose. Left eye normal, right palpebral tissues greatly swollen and discolored from hæmorrhagic extravasation, the eye markedly more protuberant than its fellow, and pupil insensible to light. I increased the size of the external wound and removed burnt and discolored tissue from its margin, together with a small bullet fragment. On opening the wound there was a small hæmorrhage which carried out some loose cerebral tissues. A three-sixteenths of an inch porcelain-tipped probe passed readily along the bullet's track downward and backward through the frontal sinus into and through the anterior inferior portion of the first frontal convolution, through the junction of the ethmoid, frontal and body of the sphenoid bones on the right side, and lodged beneath the pharyngeal mucous membrane behind the right posterior nares, from which it was readily removed. A drainage tube was passed through the wound and allowed to remain. He survived the shooting sixty hours and was semi-comatose after the first ten hours with involuntary fæcal evacuations and urinary retention. The gravity of the injury in one so old, enfeebled by insufficient food, extremely un-hygenic surroundings before and after the shooting, makes comment on the result unnecessary. There was not the slightest difficulty in following the ball through the cerebral tissue, the resistance being ample to enable me to determine that the probe was following the bullet's track.

Case 3.—In the *Vis Medicatrix*, published at Des Moines, Iowa, February or March, 1892, Dr. Conniff reports the case of a man on whom he held a post-mortem and found a conoidal ball weighing one hundred and twenty-six grains lodged in the left posterior lobe of the cerebrum. It had passed through four or five inches of bone and soft tissue before entering the brain, and was so far spent as not to be able to reach the opposite side of the skull from this point of entrance, and probably had nearly or quite all of the grease and dirt removed before it entered the brain, and was carried twenty-nine years, the patient dying from other causes. This is, I believe, the longest period which any man has carried a ball in his brain and retained a moderate degree of physical and mental ability. Yet he complained of great pain throughout a considerable of the period, and always claimed he could feel the ball in his brain.

War histories, thus far, are of but little aid to us in determining what should be the mortality of gunshot wounds of the brain, for feeble, if any attempt, has been made to treat such wounds aseptically. In our surgical history of the Rebellion, statements are made to the effect that the wound was healthy and suppurating nicely when applied to wounds of the brain, while now there is scarcely a surgeon to be found who does not prefer to have all wounds heal without pus formation. The case of Fluhrer, as well as my cases, prove that a ball may be followed through the brain and in some cases removed. When a ball enters the brain, it may confidently be expected to pass through the cerebral mass in a straight line until it strikes bone, lodges by the resistance the cerebral tissue offers, or is deflected by the falx-cerebri or tentorium. If the missile takes a straight course through the cerebral tissue, all instruments, probes, directors and bullet forceps should be straight, so that the position of their tips may be accurately known, and it will be wise to have them graduated on the shaft, to enable the operator to determine the degree of penetration, and being straight, if the ball be deflected at any point, it will be shown by the probe or director persistently hugging one side of the wound of entrance, to enable it to make the curve and follow the course of the projectile, thus indicating the direction of deviation, and when that is known its extent may be determined by bending the shaft if a suitably tipped probe be used.

In Treve's "Operative Surgery," just published, the statement is made that "the chief end effected by the surgeon in a large number of cases consists in providing free drainage and not in removing the foreign bodies, the presence or position of which is uncertain. It is a question which can do the more harm, a motionless bullet (which may in time become encysted), or a probe driven hither and thither through the brain substance."

He advises the use of an aluminum probe, as advocated by Fluhrer, and states that it must be allowed to pass by its own weight alone. There can be no excuse for thrusting a probe in any direction through normal brain tissue in the search for a ball. If the probe be of proper size and shape, it will give a definite and readily appreciable resistance before making a false passage. I am aware that this may be thought altogether too sweeping a statement, when the general opinion among medical men is to the effect that cerebral tissue cannot offer resistence to a probe sufficient to be appreciated by the touch, "except it be especially skilled," as one authority puts it. It would appear to be a very difficult matter to find a man specially skilled in this department. I found by careful test of many sections of brain in which post-mortem changes had not softened it, and no hardening fluid had been used upon it, that a hemispherically tipped probe of one-fourth inch diameter, required from two and one-half to three ounce weight to produce penetration, and one and three-fourths to two ounces to cause it to pass between the convolutions. This sized tip is sufficient to use in following any ball from thirty-two calibre upward, with a resistance to penetration that a very unskilled touch ought to appreciate, and if he cannot, he can hang on weights within safe limits, or abandon the case to some one better suited to the work, instead of trusting to his extremely uncertain touch. A three-sixteenth of an inch probe will require, under the same conditions, from one to two ounce weight to cause penetration of sulci or normal cerebral tissue, and will answer for all the small rifle balls, but both should be porcelain tipped for obvious reasons, and be carried by a small aluminum shaft, so as to give the least possible weight to the probe, and as slight lateral friction as possible to the collapsed canal, that all the resistance can be appreciated by the hand manipulating the probe, and not to be compelled to take up an appreciable part of it in resisting weight, and to have as nearly as possible all of the resistance at the probe's tip.

The external wound may give but a poor index of the course the ball takes through the brain, even though the individual shot and the one doing the shooting at the time the weapon was discharged may be known with a fair degree of accuracy. All men who have given the subject any attention, know that after a ball of any ordinary calibre passes into or through the brain there is a collapse of the walls of the track to complete filling by débris and normal cerebral tissue that has prolapsed into the track of the projectile.

Wyeth states that a gum catheter, presumably one such as is used with a stylet, a few sizes smaller than the missile, was as good a probe as could be procured. It would give more resistance to penetration than the ordinary probe. The principal objection to it is that the tip is frequently imperfect, that the shaft is the same diameter as the tip throughout, and the collapsed bullet hole produces more and more friction and consequent obstruction to the advance of the probe. It follows that before the probe advances far, the resistance may be so multiplied that it is impossible to determine whether your resistance is at the tip of the probe or in the lateral walls. Such at least has been the experience in my hands in one experimental case, in which, for the above reasons, I made a false passage. Yet in the first operation I made on the living subject and followed the ball successfully, I used a gum catheter with a stylet to keep it straight.

If a ball be completely flattened and far spent, its course may be like a boomerang through the brain, but such balls will seldom enter the brain at all, and all others will take a straight course.

As an aid to accuracy in locating the nearest point on the scalp to the tip of a probe which had been introduced along the ball's track in the brain, I had a straight bar made ten inches long with two points three and one-half inches long projecting in the same line at right angles to the bar, one point being curved and adjustable, so that when it was placed over the head it could be adjusted to the size and shape of the head; and the bar sighted with the projecting end of the probe the same as though it were an ordinary straight edge; and with one end projecting by the side of the probe and the straight bar over the top of the head sighted with the probe, a mark may be made by the side of the opposite point which must pass over the tip of the probe, and by repeating the sighting over the skull ninety degrees from the former point and again drawing a line as before, the lines must cross each other at right angles, and the point of crossing will mark the position of the tip of the probe if the sighting be accurately done. An ordinary straight edge may be used as previously mentioned, yet this is quite an aid to additional accuracy.

If the ball strikes at right angles to the surface, or within fifteen degrees, and does not penetrate, the missile will probably lodge at the point of impact or within one-half inch of said point, and will but rarely rebound. Accepting Fluhrer's statement that a ball would rebound, I was surprised to find after firing balls into skulls, and they did not produce penetration of the opposite wall, that they remained where they struck or glanced, but did not rebound. In rare cases they re-penetrate the brain after striking the opposite bony wall; but they almost invariably do it by glancing from the point of impact, at angles to the line of incidence of more than ninety degrees. I could on no account consider that a ball rebounded, unless it re-penetrated the brain by passing back from its point of impact, at an angle to the line of incidence of less than ninety degrees.

Not finding skulls sufficiently numerous on which to experiment, I had a hemisphere made of sheet steel with every possible facility made for aiding in causing bullets to rebound, and fired twenty-two, thirty-two and forty-four calibre shots into it at all angles; and in all the varying velocities which the bullets would stand, from slight deformity to complete flattening of the balls. I had no bullet rebound that was not flattened at least one-third, and a velocity which will produce one-third flattening will nearly always produce penetration of the skull. In those which did rebound it was in varying degrees from almost the exact line of incidence to near a right an-

gle. The distance which a ball will move from its point of impact after passing through the brain must depend upon its velocity, angle of incidence, the surface of contact, and shape of the ball. Unless the force of impact be great, the dura will not be cut, but will brobably be congested and the ball may remain between the dura mater and the brain. There can be no objection in any such case to opening the skull opposite to the point of entrance at the point of secondary impact of the bullet, and establishing drainage and removing the bullet if it be accessible. Whether the bullet be found or not, we can expect no harm to come from the trephine hole which will probably prevent the formation of an abscess around the bullet, and its destroying the life of the patient, as it did in my case, after the boy had shown himself capable of recovery from the damage done to his brain in the missile's passage: but he could not recover from the abscess and cerebral traumatism, and the abscess could not drain through the entire cerebral mass along a collapsed bullet hole.

Had I removed the disc earlier, the ball would have been readily found, the track of the wound could have been drained, and the formation of an abscess around the ball, or at its point of impact, made an impossibility. After a ball has traversed the brain until it strikes the opposite bony wall, if by glancing or rebounding it is again caused to penetrate the brain, it can be expected to do so in a straight line from its point of impact, and may be followed in its secondary track to its point of lodgment, with as much ease through a trephine hole as it was originally followed from its point of entrance to where it was deflected from its course. Should it strike with considerable velocity at an angle to the horizontal of less than thirty-five degrees it may sweep around the skull in close contact with the bone for a great distance, passing probably between the dura and piamater, and leaving but little evidence to show the track it took. Occasionally balls are so far spent as to lodge in the brain at some point after gaining entrance before reaching bony resistance, and again after deflection, when it becomes necessary to remove them by some means.

I found I had no forceps at my disposal which could be operated through so small a space as the average bullet hole, without lacerating the cerebral tissue. So I had Truax & Co., construct me a bullet forcep which could be operated through a cannula smaller than a twenty-two calibre pistol ball, and yet the jaws be opened wide enough to grasp firmly a forty-four to fifty-five calibre ball. The jaws are operated on the same principle as is used in some vertebrated or flexible œsophageal forceps, but the shaft is straight and not flexible, so as to enable the surgeon to determine with certainty the position of its tip. I find that it requires considerable experience and manipulative dexterity to readily grasp and hold a missile in so soft a tissue as the brain without doing damage to the surrounding brain substance. I would not recommend anyone to attempt to grasp a bullet and extract it from the brain of the living, unless he had some experience in the work on the cadaver. I would not advise the use of a trephine less that three-fourths of an inch in diameter for removing a disc over the point of impact of a bullet, as it gives insufficient room for examination with the finger or further operative interference; unless another disc be removed, which requires considerable additional time, or the opening be enlarged by the rongeur. I have been able to trace no evil results to the use of the rongeur, yet in my experience with it I have been compelled to separate the dura-mater from the bone for some distance beyond the bone gnawed off; and should the wound suppurate, it makes a point difficult to drain and increases the liability of an unfavorable issue. A large disc can be removed almost as quickly, easily and safely as a small one, and if it be removed with as complete knowledge as is obtainable of the direction the ball will take from the point of impact (if it moves at all), will probably give ample room for all further operative work in that case. The disc should not be replaced for reasons apparent to all. Cerebral localization is usually of little use in cases of this kind, except rarely when abscesses form, and then it is too late for operative measures to save but a very small per cent. of cases. If the ball be small, and especially if it be round, has passed through considerable tissue before reaching the brain, so that one may be tolerably certain that it carries in no grease and dirt, and no symptoms develop, it may be allowed to remain, otherwise it should be followed and removed if possible. In a majority of the cases pieces of bone will be broken off and carried into the brain and lodge at various points along the bullet's track, and they should be removed when accessible, as they must of necessity act as foreign bodies, producing considerable irritation, and probably suppuration to aid in disposing of them. Re-penetration of the brain by a glance or a rebound can be expected to occur but once. The ball will pass almost invariably in a straight line from where it glanced or rebounded. There exists a necessity for trephining but once, unless it be necessary to trephine at the point of entrance, for the purpose of giving more room for elevating depressed bone.

The operative rules laid down in standard authorities regarding the enlargement if need be of the wound of entrance, removal of spicula of bone, trephining, etc., are too complete to justify an attempt on my part to improve on them. I have purposely omitted from this paper the tiresome details of the experiments I have made in this work, and if necessity require it, I may at some future time place them before the profession.

SUMMARY.

1. That a ball can be followed in its course through the brain.

2. Having been followed to its point of impact on the opposite side of the skull, a trephine disc should be removed, drainage be established and the ball removed if possible.

3. That the probe is best which gives the greatest resistance to penetration with least possible lateral friction on its shaft by the collapsed canal.

4. That hemispherical front, porcelain tip, and aluminum shaft answers the indications for lead detection (resistance if of proper size, weight, etc.,) required in a probe, better than anything else.

5. That one intending to follow balls through the brain should thoroughly familiarize himself with the resistance the normal brain offers to penetration by the probes he expects to use, that he may know when he is applying force within safe limits.

6. That he should frequently grasp and remove balls and pieces of bone with the forceps of his choice on the cadaver, before attempting it on the living human subject.

REPORT OF A CASE OF TALIPES EQUINO VARUS.

Read before the Section of Surgery and Anatomy at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY B. MERRILL RICKETTS, Ph.B., M.D.,
OF CINCINNATI, OHIO.

W. D., a typical Kentucky lad of fourteen years of age, consulted me on Sept. 1, 1891, having suffered from time of birth with talipes equino varus in a most aggravated form.

The foot was turned straight backward, so that the weight of the body came directly upon the astragalus. This state of affairs necessarily caused the plantar surface of the foot to be thrown upward to such a degree that the under surface of the toes was the only part that touched the ground while standing erect.

The left foot, he said, was at the time of birth, as greatly deformed as the right, but by rubbing and manipulating it by those having him in charge, cured it.

I found upon examining the left foot that the ankle joint would allow of more motion in all directions than a normal joint should admit, thus proving to my mind that there had, at one time, been some deformity of the left foot.

However, this boy was able, with an ordinary pair of shoes, to romp and climb the hills as fast and easily as could his ordinary companions. With this ability to enter into the sports, he had the sense of pride which is possessed by all Kentuckians, and was willing to undergo almost any amount of suffering to have the deformity corrected.

I advised an operation, and after some explanation obtained the boy's consent to operate. Chloroform was used as the anæsthetic, and the operation was made on Sept. 2, 1891, at 10 o'clock A.M., in the following manner:

A Barton's bandage was applied to make the operation a bloodless one. An incision was made upon the external aspect of the instep, about two inches in length, extending from the lower end of the fibula in the direction of the lower end of the tibia, which brought me upon the ligaments and tendons connected with the joint.

I did not divide any of these tissues, merely crowding them aside so that they could not be injured in the process of extracting the bone, which I thought would be difficult.

The astragalus was found to be hard and much deformed, so that its outlines were very indistinct. However, there was but little difficulty experienced in dividing the bone, it being found impossible to extract it without dividing the ligamentous tissues and extending the cutaneous incision, both being steps which I wished to strenuously avoid. After removing the bone, I endeavored to bring the toes forward, which, however, was not very successful, as the tendon Achilles was almost obliterated, the little remaining being very dense. I found it necessary to divide all of the tissues posteriorly before the first could be brought forward in a normal position. When the foot was put in this position, the plantar facia was found much contracted, so much so that I divided it completely. The normal position was maintained with straps passed under the foot in close proximity with the toes, and made fast to hooks woven in a plaster extending from the middle of the thigh to below the knee. This proved to be a great error, as the pressure was so great from the tendency of the toes to turn backward, that a slough ensued, which complicated matters very much.

At the end of the fourth day the strap was removed, its damage not having been detected before this time. The operation was made under hot filtered water irrigation, and the dressing of the same character.

The patient recovered from the effects of the anæsthetic, but suffered a great deal. Although drainage was not provided for in this case, I would not fail to use it in another. Every time I have failed to make this provision regret has followed. It was found necessary to open an abscess on the top of the foot, under the hard callous, which had been formed by walking on it, which was at one time the sole of the foot.

Peroxide of hydrogen and water irrigation were extensively used, and the temperature remained less than one hundred after the tenth day, it previously having reached on one occasion one hundred and four. His recovery was now uninterrupted, the foot keeping its normal position without support. He was on crutches at the end of the fourth week, and left the hospital at the end of the tenth week, with but a small sinus which has since healed, as stated in a recent letter from him. A shoe is worn, and he now goes about without the use of crutches. I have not learned of one so old as this lad being operated on in this manner (removal of the Astragulus).

In my mind it is the most desirable operation to make in a certain class of talipes, that class including those cases where tenotomies give but little promise. The slope of the foot is preserved; the joint more useful, with comparatively no more danger.

The tibia is made to rest on the os calcis by the removal of the bone, the shape of which has been changed to such a degree that it will never allow the sole of the foot to rest evenly upon a plane.

AMPTUATION OF SCROTUM AND CIRCUMCISION.

(Referred to me by Dr. Garner, of St. Joseph, Mo., August 9, 1890.)

Mr. F. P., æt. 22 years, white, United States, active mind and in fair physical condition. Height 5 ft. 8 in., weight 130 lbs., brown eyes and dark brown hair, and of a nervous temperament.

He was free from syphilis, and with no predisposition to tuberculosis. Drinks tea and coffee, occasionally indulging in a glass of beer or wine, and is an inveterate cigarette smoker.

He stated that he had consulted nearly all the leading surgeons and dermatologists of this country without obtaining a diagnosis, or any encouragement in operative interference.

I found upon examination that the scrotum was thickened and about six times its usual size, as was also the prepuce, the latter not having been retracted for years.

Papillomatous growths, varying in size from the head of a pin to a large pear, studded the surface of both the penis and scrotum. There were also many small angioma.

This thickened papillomatous and angiomatous condition existed on the skin of the right leg from the apex of Scarpa's triangle to the toes, gradually becoming more extensive as the foot was approached. The greatest trouble, however, was between the upper third of the leg and the ankle.

Upon removing the bandage, which had been used constantly for years, and which was necessarily made tight, the entire leg would immediately begin to swell, and continue to do so until it would become twice its normal size, having a tense glistening appearance, accompanied by considerable pain and discomfort.

If the cuticle was abraded, lymph would flow continuously until from 5 to 30 ozs. would have escaped. This was also the case if a papillomatous growth was broken, or the skin punctured with a needle. This exudation was very annoying, as it would occur on the slightest provocation and could not be controlled, ceasing only of its own accord. The lymph was the color and consistency of thin cream, slightly tinged here and there with blood. It was bitter, and crystallized on evaporation.

When 18 months of age an abscess formed in the right groin, which was freely incised by the attending physician. From this dated the trouble in the leg, scrotum and penis.

The patient would have three or four severe chills during each year, followed by a temperature ranging from 103° to 104.5°. Delirium would accompany the chill and fever for from twenty-four to forty-eight hours.

It was found upon close inspection that the leg was larger and more uncomfortable just preceding one of these attacks. The quantity of urine voided during the time would be less for the first twenty-four hours, but would then flow in abundance. The appetite was poor, the skin clammy and of a light copper hue, the eyes glassy, and his mind dull and inactive; bowels constipated, with great tenderness in and about the right iliac fossa. There were also extensively enlarged glands in this region.

Under the circumstances, I advised complete circumcision and scrototomy at the same time, explaining how it might be possible to have a great loss of lymph from the severed integument. However, consent was given to remove the prepuce. If this did not cause trouble, he would allow me to amputate the scrotum later on.

Circumcision.—Within a few days he presented himself for operation, which was made painless with cocaine. An incision was made upon the dorsum, after which the lateral incisions were made, thus baring the gland entirely. There was no blood or flow of lymph whatever to complicate matters, and the patient made a rapid recovery, being on his feet constantly after the first three days. Numerous small papillomata were found distributed over the surface of the gland, many of which were of a pearly white, while others were reddened, giving the appearance of angiomæ.

His anxiety was now relieved and the irritable condition of the gland and prepuce at an end, all of which gave him courage to undergo the more severe operation. He gained five or six pounds during the following two months, at the end of which he decided to have the scrotum amputated. This was done in November, 1890, in my private hospital, in the following manner:

After applying a King clamp, one-third of the scrotum was removed and the edges brought together in the usual way. It was found that the vascular supply was much greater than in a normal scrotum; some of the vessels being twice, while others were three times their natural size. In consequence thereof considerable hæmorrhage ensued.

It was found, however, that the exudation of serum was slight and of but little importance, while the principal bleeding point was obstinate.

The patient rallied nicely from the anæsthetic, chloroform, and complained but little until about 11 P.M., when he suffered considerable pain. There was constant oozing from the wound, with extensive swelling of the entire scrotum. This led me to suspect concealed hæmorrhage about 3 A.M., when I cut the stitches to find the scrotum distended with blood clots. There was also arterial hæmorrhage, evidently from the same point as at the time of the operation, at 10 o'clock of the preceding A.M.

The cavity was evacuated and exposed to the air, when the hæmorrhage ceased. The stitches were again adjusted and the wound dressed with dry boracic acid. He remained in the house for one week, at the end of which time he left for his home. Part of the wound healed by granulation.

During the following year he had but two or three chills followed by fever. He gained flesh, felt more comfortable, appetite better, slept better and felt entirely satisfied with the result.

The operations were not with the view of curing the patient—merely to relieve. I feel assured that the end justified the means.

I believe I was wholly responsible for this accident, in that had I been more careful in torsioning this artery, the unpleasant hæmorrhage would not have occurred.

NEURECTOMY OF THE POPLITEAL SCIATIC NERVE FOR PAINFUL NEUROMA AS THE RESULT OF GUNSHOT INJURY.

M., æt. 27 years, a tinner by occupation, consulted me on August 14, 1891, stating that he had been shot two years previously through the leg, and that he had suffered excruciatingly ever since. He also stated that by the advice of the attending physician he had become addicted to the habit of taking morphine hypodermically until he had reached the daily maximum quantity of fifteen grains. This statement was easily verified by the innumerable pigmented points upon the legs where the hypodermic had been inserted.

Upon examination I found that the ball (38 calibre) had passed obliquely through the left leg, entering on the inner side three or four inches above the condyle, anterior to the ham string of the biceps, passing upwards at an angle of 45°, making its exit externally about the middle of the thigh.

At the time the revolver fell from the counter and exploded (for this was the way the accident occurred) he was standing erect. Immediately upon hearing the report he felt a severe pain in the toes of the injured leg. Thinking that he was shot in the foot, he had his shoe removed, but could not find anything to indicate such a state of affairs. He did, however, find a stream of blood flowing down the leg, indicating that the injury was higher up the member, and which led him to the exact point of entrance of the ball. The pain within an hour or so became equally distributed over the foot and that portion of the leg below the injury.

As pain is the thing for which the physician is most consulted, he went from one to another, trying every remedy that might be suggested, without relief; hence, the advice given by the physician in a fit of desperation, to relieve himself of the responsi-

bility of caring for such a patient. He would take an injection wherever he might be, when the pain came on; whether it was on the house-top or in the shop. I saw two of these doses taken, satisfying me that each contained five grains.

Operation.—Aug. 20, 1892. Leg shaved and cleaned as well as possible, chloroform administered and rubber bandage applied from toes upward. An incision four inches in length was made in the median line posteriorally, encroaching upon the popliteal space. The skin being divided, I tore my way through the tissue at once, exposing the nerve, which was three times its natural size, for a distance of one and one-half inches. Upon examination I found that the nerve divided much higher up in this case than any I had ever seen, fortunately for if it had not been both branches would have been divided. I found that the external branch was the uninjured one, and that it was adherent to the internal one for a distance of three inches. A section one and three-fourths inches long was excised, which included the entire enlargement. Before dividing the nerve, a silk thread was passed through it, on either side of the enlargement, so that the ends could be brought together by flexing the leg at right angle. The leg once flexed, the ends were coapted and a silk suture applied on each side of the central artery, that it might not be injured. I then passed another silk suture through each stump, one inch from their ends and tied them, so that too much tension would not be brought on the two smaller ones—distributing the tension. The external branch being much slackened by the flexion was left to care for itself. A drainage tube was placed in the wound and silk suture used to close it.

The leg was kept flexed by a strap about the ankle, attached to a band about the body. Upon rallying from the operation the patient complained of pain, the character of which was similar to that before the operation, so that it was necessary to give one-half grain of codeia at 7 P.M and 9 P.M. following the operation. The use of morphine was forbidden and the use of bromide and chloral resorted to.

The temperature reached one hundred on two different occasions and remained about ninety-nine during the course of recovery. The Faradic current was used with great benefit at various intervals. The drainage tube was removed on the third day and the cutaneous stitches on the fifth day, at which time there was a slight discharge which continued for about fifteen days.

On the twelfth day the leg was let out five or six inches and the patient allowed to sit up. The pain was more severe while the patient was lying upon his back than while sitting up or around on crutches.

He was allowed to be up and about on his crutches every day after the twelfth day. The pain gradually disappeared, and he was allowed to leave "The Trinidad" on Sept. 10, 1892, having been in the hospital twenty-two days.

I heard from him recently, and find that he is free from pain and the morphine habit.

Dr. Ridlon of Chicago, believed that there are certain cases of congenital club-foot that cannot be cured without excision of the astragalus, though some claim that all cases can be cured by stretching and dressing, and others that all can be cured by tenotomy. He had a case in which different dressings were carefully applied with an unsatisfactory result; then tenotomy was done and the foot dressed with plaster of Paris and still the case relapsed, then the open operation of Philipps was done, and even then, after wearing carefully adapted apparatus, it relapsed. Finally the astragalus was removed and it was found to be wedge-shaped posteriorly, which accounted for the difficulty in keeping it in position. The result was perfectly satisfactory.

Dr. Sayre, of New York, said that he would not go so far as to say that all cases of club-foot could be cured without removal of the astragalus, but he had never seen one which required it. Even if we have this distorted condition of the astragalus we must remember that at first these bones are soft and malleable, and if the foot is put in correct position the bone will be moulded. He could conceive of cases, where there was absence of different parts of the foot, where removal of parts of bone might be necessary to correct deformity, but in congenital cases treated from the outset, he was of the opinion that no bone operation was required. He had not yet met with an advanced case that required bone cutting operations, and he had seen cases in persons from 26 to 46 years of age, which had been without treatment since childhood. Complete section of the ligaments and all holding soft tissues was sufficient if combined with great force in putting the foot into normal position. The reason why so many cases relapse is because they have never been cured. No case should be considered cured until it can be retained in position without apparatus. Something may be said for operation if the patient cannot afford the time for the slower treatment.

WHAT IS THE RELATIVE INTERDEPENDENCE OF ORGANS OF THE BODY IN HEALTH AND DISEASE?

Read by title in the Section of Practice of Medicine at the Forty-third annual meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY J. B. HERRICK, M.D.,
OF CLEVELAND, OHIO.

In presenting my thoughts on this subject I am moved with a desire to express to you those things which we have all seen in our professional experience. From those observations we may piece out our conclusions—examine them, and approve or decline their acceptance. By such processes do our minds make progress along the way of truth. The conclusions in the complex problems of medicine are oftener determined by the point from which we start. In giving my thoughts on this subject I may say further that I have no expectation of presenting any new principles but old established ones in a relation from which we may hope to draw profitable conclusions.

The problems regarding disease are so obscure and involve so many and such varying factors that their solution has baffled the skill of wise men of all ages—and as yet, though we have to deal with natural phenomena which present uniformity, except in varying conditions, we have not rested our inquiries upon any absolute principles, from which we can reason with unanimity in the interpretation of facts. Medicine is called an uncertain science, and we confess with some show of truth which result often in most unsatisfactory empyricism in the art. In this we find the varied and conflicting theories of pathology, and also conflicting methods in the art, so that the problem before us is to establish some principles on which we can rest, and art that shall be established so as to require the one practicing it to consider the differences in each case, and apply such remedial means as shall appear reasonable because referable to some accepted principle. It is some such reflections as these that the question of the relative interdependence of organs in health and disease, presents itself for solution. To this inquiry I respectfully solicit mutual attention. We recognize the mechanism of the body as complex; with each part dependent upon another, so that the whole can attain its typical structure and function, only when the

several parts each attain their special end. While this is true, it is also obvious that there are degrees of dependence and interdependence among the different parts, which it is always essential to recognize in a pathological and therapeutical point of view.

That the different vital organs are not equally responsible for diseased conditions we readily admit. As all forms of disease must be looked upon as only a disturbed normal process in some organ, or group of organs, an inquiry as to the interdependence of the different parts may be regarded as an essential step in the solution of the problem of diseases. The body is so complex an organism that we are prone to overlook the fact that it is made up of different groups of organs having certain related functions, all of which constitute the phenomena of life. It is a mechanism, and each of its different parts have certain essential functions while others are more or less passive. It is to call attention to this relationship among the different organs, and in doing so to enquire as to the beginning of disease that I present this subject. Recently I was called to attend an elderly gentleman, a watch maker and repairer, who was a shrewd yankee and withal very skeptical as to the skill of physicians to diagnose disease and any scientific guidance as to remedies for their cure. After some general conversation, I asked him if in his experience in repairing watches he had not found that certain parts of the watch were prone from certain peculiarities of contruction or activity of function to get out of order, more easily than others. Were not the diseases and defects of the watch generally found in certain parts? To which he promptly replied, "yes." What are those parts? I asked, "The escapement and mainspring," he said. I took occasion to show him that his body was as distinctly a mechanism as the watch, and that the conditions of health were as strictly dependent upon the organs of the body as the watch for keeping time upon its intricate parts. I also assured him that there were certain parts of the body's mechanism that were prone to disturbance in consequence of which the whole phenomenon of health was liable to be impaired. For the purpose of showing this relationship I have arranged a grouping of the tissues and organs of the body with reference to their mutual dependence. I am aware that this grouping is somewhat arbritrary, and is given only to assist in answering the question before us, and making my thoughts clear. In this arrangement I have made three groups. Under the first group I have placed those parts that are entirely passive and wholly dependent upon other parts for their support. In the first group we have

1. Osseous tissue.
2. Connective tissue.
3. Cellular tissue.

In the second group I have arranged those organs whose functions are active in securing the ultimate end of life,and which contribute to the support of all the others and yet are themselves dependent. In this group we have arranged

1. The circulatory system.
2. The muscular system.
3. The nervous system.
4. The reproductive system.

This group includes those organs that perform the active and responsible functions of life. In the third group I have arranged those organs whose functions are elementary and entirely accessory to the second group. The functions performed by this group are essential for those of the second. If they are in any degree suspended or defective their influence is felt in the functions and they of all others are prone from natural causes to disturbance of the more active organs of the second. The group includes:

1. Organs of Secretion.
2. Organs of Digestions.
3. Organs of Absorption.
4. Organs of Assimilation.
5. Organs of Excretion.

This third group, it is to be observed, includes all the organs which contribute to the marvelous process of transforming the varied alimentary substances included in foods, into blood, which is the first essential material for the nutrition of every part. It is obvious with some such grouping of the organs and tissues for the object intended we are able to appreciate the function of each group and consider the relative dependence of each. For example, it is evident that for normal nutrition and structure the osseous tissue and its group are entirely dependent upon other and accessory parts and processes. All diseases of bone, connective or areolar tissue are always due to certain abnormal condition of nutrition, as blood, blood supply, or nerve influence. Each of the tissues in this first group have passive functions. If other functions on which they depend are normal these will always be normal. If we carry the same inquiry to the second group of organs that have more active functions we find among them certain absolute and uniform conditions necessary for nutrition and normal functions. It may, I think, confidently be asserted without question that if there is a right state and supply of blood and normal nerve force the function of each will be normal; nutrition will be normal, health will prevail in each of the organs of this group. Whichever of the various views of pathology is accepted we should follow along the line of physiology to detect the pathologicial, the normal to detect the abnormal. It is obvious that whatever of morbid material exists and whatever its form, either germ life, necrotic-material or mineral poison, for working its morbid effect, it must be carried to the tissues through the agency of the blood vessels or lymphatics. Accepting this statement, it would seem to follow that the function of the second group of organs will be normal if the functions of the third are performed.

The second group includes organs which are concerned in all of the active operations of life—their action may be regarded as ultimate or for the chief ends of life, and this action always depending upon the coördinate nutrition of all parts, and also those for the completion of these functions themselves.

If my statements are correct, and conclusions accepted, it is obvious that the five processes included in the third group of organs, as I have arranged them, are the first essential processes for the completion of all others. If secretion is defective, digestion is abnormal; if digestion is abnormal, absorption is defective or material defective for assimilation is absorbed; if absorption is abnormal assimilation is defective. Assimilation being defective, or imperfectly assimilated material passing into the circulation, the organs of excretion are the first to suffer, their function being to eliminate effete or morbid

V.1
189

material; but unassimilable material cannot be eliminated by these means without working injury to the organs of excretion. For example, if an excess of amyloid food is taken more than can be transformed by the assimilative process of the liver it passes into the circulation of the blood and finds its way out through the kidneys, as the organs of elimination, and being a crude, unassimilable material it acts as an irritant to kidneys as in diabetes. The disease of the kidneys is secondary. Again the blood making process being defective the blood is ill adapted for its function as the chief element of nutrition. With such a condition nutrition is impaired in the passive tissues of the first group, also the nutrition and function in the active organs of the second, also the organs of excretion of the third group. May not many of the diseasss of the lungs find an explanation by this reasoning? Under such conditions there is in each group obviously a merging of physiological processes into pathological. It is hardly necessary to observe that the pathological changes are always slow; that no disease occurs suddenly, but there has been a gradual lapse of the normal into the abnormal. From this it is appreciable also that disturbances in the first and second groups cannot be corrected except as we look back to the third group and there seek to correct the beginnings of disturbances? Is not every experienced physician conscious that we are unable by known remedies to change directly or continuously heart action, muscular power or nerve force or any of the functions of the second group of organs, much less the tissues of the first group? The third group of organs we have special power to control, assist or modify. Secretion is a function which may be markedly changed by remedies. The whole complex process of digestion depends upon ferments secured by secretion. Disturbed secretion is followed by disturbed digestion which is the first essential condition of health. The glandular organs of this group are of all others prone to disturbances and the most great and serious of all diseases are attributable to defects in the organs of this class.

When we consider the complexity of the process and the variety of food taken under the enticement of appetite, is it strange that most diseases are to be referred back to the digestive group for the origin of disease? Besides it is our province to guide the selection of appropriate food, both for digestion and for the wants of the organism in its varying conditions of exercise. Food may become wholesome for the wants of the system or from some defect in quality for digestion, or excessive in quantity become the rankest poison. I am impressed with the idea that if I could adjust the food to the wants of all, and appropriately guide their exercise, I could by such means remove a large portion of the sickness of the world. Other organs that are notably under the care of the physician are the organs of excretion, also arranged in our third group. The elimination of effete or morbid material we are in a very marked degree able to influence and control. Indeed, every physician finds his largest duty to consist in supplying pure air for the eliminating process of respiration, correctives for the disturbed secretion, and excretion cathartics for clearing the digestive canal, diuretics for the eliminative functions of the kidneys, diaphoretics for the respiratory function of the skin.

It is observed that in all those therapeutic matters we are dealing with the third group of organs in our schedule, and in all these means our skill consists largely in appropriately controlling those functions which are essential for the right state of blood. Those who have had experience in the practice of medicine are conscious that they are unable in a single case to select a remedy which has specific virtues for the cure of any normal disease. They know that all means must be directed to the blood-making and blood-purifying processes, and through the blood to nerve and function of the part affected. They further learn the futility of local agencies to cure idiopathic diseases, as liniments for rheumatism, local applications for diphtheria, erysipelas, or any of the diseases of internal organs. Local means have their place as efficient agents, but the treatment must look back to the conditions that control nutrition. Who can reasonably expect to cure tubercle of the lung or any part by local applications, cancer by excision alone, a specific ulcer by local applications? Are we not able at this stage of our knowledge of physiology to detect the cause of disease as always due to some disturbing agent of nutrition which has definite conditions? With such a view of the art of medicine we may see how contemptible any restricted pathy is which proposes to guide to the cure of disease except as it looks to the correction of physiological disturbances. I am aware that the standing problem to-day for the physician as it has been in all ages is the cause of disease. In answering this question external and internal agencies have been named and their influence vaguely defined. Is it not appreciable that most causes of disease must act to disturb the functions of one or more of the organs of the third group except, perhaps in a few instances where poisons and parasites are distinctly traced? In this line of inquiry if we are met by those who accept the parasitic theory, which is that diseases are the result of microörganisms in the form of bacteria I reply that as yet we have been unable, except in a very limited way, to establish causation from germs or to find any specific agent as an antidote to any of the so-called specific diseases, and in my judgment we need not expect it. Further, I must call attention to the power of resistance in the body, against such infection. It has been fully shown that it is able to resist the infection from disease germs when it is in its normal standard of health.

Mitchenkoff has shown that by a process known as phagocytosis or cell devouring cell, the assimilating power in the blood is sufficient to cope with the lower form of cell life. Bouchard and others have observed the destruction of bacilli by the spleen and their elimination by the kidneys. Buchner and Lubarsch have shown the bactericidal power of blood serum. The liver is also shown to have a destructive power over each organism, and thus guard the system from these sources of disturbance.

If in full health, the antagonism between the normal tissues of the body and disease germs has been shown to be a rational means of defense, these agencies we should wisely guard, rather than that all of the attention should be given to exclude germs from the body. This line of reasoning regarding the antecedents of disease is the outcome of a desire to see adopted by the profession some universally accepted principles on which the practice of medicine may rest as a true art. If clear appreciable principles are established which none can gainsay we have the ele-

ments of a true science. The art must, as in all arts, rest upon the judgment of the one practicing it. When such reasoning prevails there can be no place for any of the conflicting theories; there can be no allopathic, homœopathic, hydropathic, uropathic, or any other of the various schisms in medicine. Our practice would then be spoken of and given the confidence due to a rational profession, because all the methods of treatment would be referable to the primary organic disturbance rather than to vague and ever varying symptoms. Inasmuch as we deal with natural phenomena which are always uniform, except in varying conditions we have the elements of as true a science as chemistry, astronomy or physics. The art, to be sure as all other arts, must rest upon the varied and conflicting judgment of those attempting to apply it. With the principles of a true science established, our profession will be glorified because it reaches out and grasps the forces of the Eternal, which tends in the constant changes to conserve human life for a higher end.

AMPUTATIONS IN THE LIGHT OF MECHANICAL SCIENCE.

Read in the Section of Surgery and Anatomy at the Forty-third annual meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY STEWART LEROY McCURDY, M.D.,
OF DENNISON, OHIO.

Professor of Orthopædic and Clinical Surgery, Ohio Medical University, Columbus, Ohio; Lecturer on Topographical Anatomy and Landmarks, Western Pennsylvania Medical College, Pittsburgh, Pa.; Surgeon, P., C., C. & St. L. Ry. Co.

Dr. Oscar H. Allis, in his paper before the Pennsylvania State Medical Society, June 4, 1891, said: "Don't amputate through the joint; go above or below it." Such a statement by a surgeon of such thoughtfulness and eminence must necessarily carry with it a vast majority of men who amputate, but who allow other men to do their thinking. No one, of course, would for a moment suspect Dr. Allis of making such a statement unless he believed it, and such a conclusion could only be the result of a thorough investigation of the prothegenetic as well as of the mechanical phases of the question.

After having made a study of the matter for the past number of years, I am compelled to make the statement that joint amputations afford the best stumps, and no surgeon is justified in going three inches above the ankle and knee, as the limb maker, Truax, suggests when a disarticulation can be made. Why should three inches of a human extremity be sacrificed because of lack of ingenuity on the part of the mechanic? No; but rather compel the mechanic to fit the stumps you send to him.

There are many reasons why the natural articular surface of a bone covered with abundant soft tissue makes a more durable stump than one formed by a cut through the shaft of a bone. Nothing is more natural than that dealers should, and do, advertise the goods they have for sale, and if he can make a leg that will fit a joint amputation, he will so advertise and recommend the surgeon to disarticulate; but if he cannot successfully do this, he is sure to advise the surgeon to go far enough above the joint to make room for the machinery of his limb. Is this merciful or right in any sense? Yes, it is right unless it is possible to adjust an artificial limb to joint amputation, but it is radically wrong if such limbs can be made and proven more durable and comfortable to the wearer. Dr. Mordecai Price, of Philadelphia, said: "If he had to have an amputation below the knee, he would prosecute a man that would give him a stump of more than four or five inches." While it is undoubtedly unwise to go nearer than three inches, and better six inches above the ankle, when the articulation has to be sacrificed. I am firmly convinced that a Syme's amputation makes the best stump possible, and I may say the most comfortable of all stumps. I am also convinced that a disarticulation at the knee joint furnishes a most admirable stump for the adjustment of an artificial limb, and is much more serviceable than at any point above the joint.

Why then should amputations be made through the joint in preference to points above. 1. The broad articular ends of bones make better stumps than cuts through the shaft.

2. The knob (I may be allowed to call it) formed by the condyles at the knee, and maleoli at the ankle, furnishes points about and above which the socket can be adjusted which prevents the pumping motion so common and so very objectionable when a cone stump is to be fitted.

3. Artificial limb makers can and do make limbs for disarticulations.

As to the first proposition. No one will doubt the advisability of making disarticulations, nor will they recommend the sacrifice of one inch more of human tissue than is absolutely necessary, provided stumps at the joints can be satisfactorily fitted. One maker says: "Amputations at the knee are very favorable and are preferable to any point above." Again, the same maker says in speaking of Syme's amputation: "This amputation leaves a stump that combines the greater number of favorable conditions * * * is better than above or below * * * the end of the stump bears the weight, and the patient can be supplied with a leg that fills the highest possible conditions and at the least cost."

Other quotations might be made, but suffice it to prove that limbs *are* made for disarticulations and are better than above the joints.

In Syme's amputation, I have a patient wearing an adjustable lacing socket limb made by the Pittsburgh Artificial Limb Co., who is a freight conductor, and he can jump on and off trains going as fast as he ever could.

I have a number of letters from men with Syme's amputation wearing limbs, and in no case do I find anything but commendation for the satisfaction they get in wearing their substitute.

Puddlers, railroaders, clerks, and laborers of all description, who are compelled to stand or walk all day, have no complaints to make.

In a Syme's or knee operation, the bearing can be received and divided at the will of the patient between two different points. In case of the ankle by simply slacking the lacing of the socket, the bearing can be thrown on the end of the stump, and by tightening the lacing the weight can be received by the head of the tibia.

In knee amputations, so also can the bearing be shifted from the end of stump at the knee joint or upon the muscles of the thigh as may be the pleasure of the wearer. In either case, the patient learns to all the time divide the weight upon the two points and thus make just half the pressure that would be in a leg or thigh amputation.

Surgeons would hardly question the advisability of doing disarticulations provided they were sure they were giving their patients a stump that could be fitted by the mechanic. Again, who will question the advantage of the broad surface of the condyles covered with synovial membrane cartilage, and the structures nature intended to receive pressure, has over the end of a bone cut through the shaft.

The practice of sawing off the condyles and the maleoli is certainly a misguided step. These knob like ends made by the condyles and the maleoli are of wonderful advantage to the patient. When a conical stump is put into a corresponding socket, there is nothing to hold the leg in the socket but a strap worn over the shoulder This is all right; but in disarticulations this is unnecessary. From the fact that the condyles and maleoli have a greater diameter than a few inches above these points, the limb maker is able to adjust these points and thus prevent the annoying pumping motion of the stump in the socket.

If the condyles or malleoli have to be removed, then there should be no question as to the advisability of making the cut far enough from the joint to allow room for the machinery of the limb maker. It is also argued that when one-half of a joint is removed a substitute cannot be made and retain the normal relationship of the joint. This is not the case, for I have here a limb that places the joint parallel with the lower end of the femur. These photos show a patient wearing one of these limbs, and as you see in the three positions, the act of a full step is shown, which is evidence that a joint can be substituted and the normal relationship of the joint retained.

I am firmly convinced that artificial limb makers should make their limbs so as to make the bearings upon but four points:

1. The ankle as in Syme's.
2. Below knee, or about the head of the tibia.
3. Knee.
4. Perineum.

By this I mean that a conical stump of soft tissue which draws the skin back over the end of the bone, cannot be as comfortable to the patient as a bearing upon the normal articular ends of the bones, or fixed bony prominences.

In all amputations above the knee, I am sure that the future limb will be made so as to receive the bearing on the *tuber ischii* by the use of the Thomas' ring.

Orthopædic surgeons have long since considered this the only bearing for splints that are to receive the weight of the body.

As to tarsal amputations, I believe the proper thing to do in such cases is to perform your Chopart, or a Hayes, tenotomize the tendo Achilles, and in some way induce anchylosis of the remaining tarsal and tibio-tarsal joints. This, you will say, will throw the patient upon the remaining end of the stump in the act of walking, and thus make a limp. I say no.

Please study the part taken by the ankle joint in making one step. As the foot is thrown forward, the ankle joint is extended, and when the leg is perpendicular the joint is at a right angle to the axis of the leg. As the body is thrown forward, the joint does not go into flexion as might be supposed, but instead the foot retains almost the same relationship to the leg as it did when the body was vertical to it. If this be true, then the act of flexion of the foot is not essential to graceful walking. If you notice, as you throw the body forward, there is a graceful rise of the heel from the surface, and the body's weight is received by the ball of the toe.

In other words, the ankle-joint of an artificial limb plays a very minor part in the act of walking. Dr. Cathcart, of Edinburgh, Scotland, has made a thorough study of this subject, and to his papers I most respectfully refer you.

Truax, in his article upon amputations, says: "See that the end of the bone is well rounded or smoothed at its outer border." This reminds me of the boy in my practice who wanted a brass knob put on the end of the bone in his leg after amputation. Nothing is more absurd, and would tend more to encourage necrosis of the end of the bone.

Surgeons should not only know what limb makers cannot do, but they should also know what they can do; and it is their duty to study the prothetical side of the question as well as the surgical.

The writer would do well to cut into a stump of a dead man and see that nature does the rounding up of the end of the bone, and if the surgeon would dare to assist her, his meddlesomeness would be criminal.

The photos 1, 2 and 3 represent a disarticulation at the knee joint, with the knee in the positions necessary in the act of walking. Cuts 4, 5 and 6 represent a Syme's amputation. The patient is a railroad freight conductor, who runs over trains, and jumps on and off trains at ten miles per hour. This man says the point of bearing is just where he wants it —either on the end of the stump or around the head

Fig. 1.

Fig. 2

of the tibia. Cut 1 represents an artificial limb for a Syme's amputation, and cut 2 represents one for a knee joint amputation.

Dr. Adams inquired as to the use of an artificial foot after Pirogoff's operation.

Dr. McCurdy replied that this operation should not be made at any time, but a good foot can be made for this operation.

Dr. King, of Missouri, disagreed with almost every point made in the paper, basing his objections on considerable experience in railroad surgery. He said that the best artificial limbs were the hollowed out willow limbs, and he con-

sidered the cone-shaped stump to be the best. The patient is not expected to walk on the end of the stump. He made it a rule wherever he could to go above the joint.

Dr. Craig, of Pennsylvania, said that he had made a special study of the surgery of the lower extremity, and he agreed with Dr. King. The effect of saving the joint after the ball of the foot is removed is to make the man a permanent cripple. The amputation two inches above the ankle joint gives you no more control than a few inches below the knee, but it exposes a large portion of the limb to friction, and makes a tender limb from the effects of the wrappings round the lower extremity. He believed that every foot to be removed near the ankle joint will be better removed halfway between the ankle and knee.

FORCED RESPIRATION (FELL METHOD), PER FACE MASK AND TRACHEOTOMY IN DIPHTHERIA. REPORT OF CASE.

Read before the Section of Surgery and Anatomy, at the Forty third annual meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY GEORGE E. FELL, M.D., F.R.M.S.,
OF BUFFALO, N. Y.

The following case is presented with the belief that it has some features of novelty of an interesting character and

1. To illustrate how forced respiration may be of great value in surgical operations associated with conditions of asphyxia.

2. To illustrate its value per face mask and also tracheotomy in cases of membraneous diphtheria and croup.

3. To demonstrate the value of peroxide of hydrogen in asphyxia produced by membraneous exudates in the trachea and bronchi of the lungs.

The history of the case may also prove a valuable lesson to parents with children suffering from throat trouble, and who hesitate to call a physician in time.

A resident of Buffalo, whose family consisted of wife and four children, the eldest a daughter 9 years of age; a son 7 years and 3 months; a daughter 4 years, and an infant son, 2 years of age. The eldest daughter was taken ill with throat troubles and general disturbance of the system. She was quite sick and was taken from school. On the 29th of March, 1892, the eldest son was taken sick, and he like the sister, was treated with home remedies until about 5 A.M., on the Sunday following, June 4, when the father discovered him in a cyanotic condition, breathing with great difficulty, and evidently in great danger. I was called about 8 o'clock in the morning, and arrived at the residence an hour later. On examination I found the four children ill with diphtheria, the exudates being quite clearly marked in the eldest daughter and the son. The son was respiring with great difficulty, and his life was in immediate danger. I informed the father there was only one thing that could be done at that time, and recommended tracheotomy as a means of holding the case, but held out no hope of ultimate recovery of the child. The younger children were also ill, the exudation, however, not so extensive, as the disease had affected them later than the first two. The mother desired the operation to be made. I sent for Dr. Colton, near by, to assist me, but before we were ready to make the operation the lad became unconscious from the cyanosis, and necessarily in a very desperate condition. He was placed upon a table, the initial incision made for the operation of tracheotomy. The blood was purple. No anæsthetic was used, as it was not necessary. A few moments after the first incision was made Dr. Colton called my attention to the fact that the pupils of the eyes were rapidly dilating. I had fortunately prepared my forced respiration apparatus so as to have it ready for immediate use should occasion warrant, and had it not been ready I undoubtedly would have had the experience which frequently comes to some surgeons, of death occurring during the operation. I immediately placed the forced respiration cup upon the face and respired for the little fellow, resulting in changing the blood to a bright scarlet in the wound in the neck and causing the return of auto-respiration. I proceeded with the operation, and found it necessary before I completed it to repeat the respiratory work with the forced respiration apparatus some six or seven times, in some instances having to respire quite a little time before auto-respiration was re-established. This is an unusual and peculiarly interesting fact, associated with the question of interference with respiration through exudates in the respiratory tract, that it is possible, (it may be for a short time only,) to breathe, retain the life of a patient, overcome the influence of the exudate and tone up the system so as to enable auto-respiration to be carried on. I completed the operation and placed the tracheotomy tube in the trachea, and even then found it necessary before consciousness returned to respire some time for the lad. After becoming conscious he breathed with very little trouble for quite a period of time. The general treatment directed was a spray application to the throat and nasal passages of the peroxide of hydrogen, about 30 per cent. aqueous solution. The father was directed to use this occasionally in the wound in the neck if he found it necessary. The afternoon of the day of operation revealed a condition similar to that which existed after the operation in the morning. The boy was moving around the house, although the respirations were at all times more or less labored. At intervals the inner tube of the tracheotomy tube would close up with the exudate and require frequent cleansing. The father stated on my second call that if he had followed my directions to merely spray lightly the wound in the neck, his boy would have died before my return. He found it necessary to place the tube of the spraying apparatus in the opening in the neck, or in the tracheotomy tube, frequently to prevent the cyanotic condition from ensuing, that "the spray appeared to liquify the membrane, or the mattery substance, and cause it to come away in a foamy, frothy state." During the afternoon the condition of patient became worse, the membranes filling up the trachea apparently, so that Dr. Colton, who was present, applied the forced respiration through the tracheotomy tube, again relieving the little patient from the severe dyspnœa which prevailed at the time. Sunday night the case progressed about the same, frequent resort having to be made to the peroxide of hydrogen to enable the little fellow to get along at all. On Monday and Tuesday extensive membraneous casts of the tubes and trachea were coughed up and passed out of the tracheal opening. The boy retained his vigor under the adverse conditions existing until Tuesday afternoon, when the exudate seemed to be increasing and interfered with the respiratory efforts, which condition could not be overcome, even by the forced respiration apparatus, and about eleven o'clock Tuesday evening the patient died from exhaustion and heart failure.

The other patients in the house had upon my arrival been placed upon the common method of treatment which I used in these cases, tincture of chloride of iron, chlorate of potash, bichloride solution and so on internally, with the peroxide of hydrogen spray used every 10 to 15 minutes. While the exudates in their cases were very extensive, there appeared to be no serious invasion of the lung tissue, and they both made a nice recovery without any serious complications.

It was very clearly evidenced in the case of the boy that he would have died before I could possibly have performed the operation of tracheotomy had it not been for the forced respiration apparatus. How many cases of a serious character might be benefited, or have life retained by such work, and tided over the most serious results, cannot be foretold. It is unreasonable to assert that some patients may not recover who are as seriously sick as was this young boy.

Regarding the peroxide of hydrogen, its value was unquestioned. It produced liquefaction of the membranes in the throat; but whether a weaker solution would have proved more satisfactory or not, I am not prepared to state. As mentioned, the solution was about 33 per cent., and this apparently produced

no uncomfortable effect when sprayed directly into the tracheal wound. This treatment appeared grateful to the patient in his distress, as also did the forced respiration application when it was made. In fact he eagerly requested that it be utilized later in the case, as it had relieved him once or twice. But, of course, the difficulty was in the prevention of formation of the exudates, which ultimately prevented the respiratory process from being carried on, weakening the patient so that the heart succumbed to the strain put upon it. I think there is no question from the result of the other cases that had this boy been placed in time upon the treatment to which the other children were subjected he might have recovered.

This paper is presented to this Section on account of its bearing upon an operation the surgeon must frequently perform, and if through means of this character the surgeon may be prevented from experiencing that most unenviable notoriety of losing a case during an operation it will be worth the time expended.

ADVANCES IN ASEPTIC SURGERY.

Read in the Section of Surgery and Anatomy, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY FRANK J. THORNBURY, M.D.,

LATE SENIOR RESIDENT PHYSICIAN, CINCINNATI HOSPITAL, CINCINNATI, O.; DEMONSTRATOR OF BACTERIOLOGY, MEDICAL DEPARTMENT UNIVERSITY OF BUFFALO.

I desire to precede the reading of this paper by the statement that much of what I have to say is the product of work recently done in the von Bergmann Clinic, at Berlin.

Many of the ideas and facts are comprised in Schimmelbusche's "Aseptische Wound Behandlung," recently published to formulate in no limited amount of original work, done by von Bergmann's corps and other German investigators.

Having been assigned the English translation of this book, I take the privilege of utilizing some of its contents in this paper, which may serve in a measure as an introduction to the translated volume, which I hope in a short time to have completed.

In considering the subject of the advances in this department of our science, it seems very appropriate to review for a moment the past state of events, that we may be better able to draw the necessary deductions and convince ourselves of the extent of the progress.

We will not go back to the time in which deficiency of anatomical and physiological learning, as well as incompetency in technique, impeded the progress of surgery—but rather refer to a later era of uncertainty in the results seemingly dependent upon some grave mysterious influence which pervaded the field of surgery, and baffled the operator's most earnest efforts.

I refer to the time when the subject of wounds and fever were inseparable; the time when healing without inflammation was unknown, and wound suppuration appeared as the *natural* reaction of the injured organism.

This was the time when Pirogoff wrote that "all efforts of the physician and surrounding circumstance were of no avail, and that the results of an operation are dependent entirely upon fate."

Suppuration, purulent œdema, tetanus, gangrene and erysipelas were called the "scourges of surgery." They followed the operator step and pace, defeating all his efforts.

"Eighty per cent. of all wounds are complicated by gangrene," wrote Lindpaintner from Nussbaum's clinic, in Munich. Erysipelas was of such common occurrence in association with wounds, that men came to regard it as almost a natural complication.

It was made an established rule never to suture scalp wounds, on account of fear that pus would accumulate.

Healing by primary union was almost unknown, and suturing had at most the result of causing retention and accumulation of the secretions and favoring the development of erysipelas. In one report of seventeen amputations, eleven died of pyæmia alone.

A compound fracture seldom occurred which was not either at once amputated, or else the patient died soon as the result of intercurrent gangrene, purulent infection or septicæmia.

The mortality of compound fractures in Volkmann's clinic at Halle for a number of years was 40 per cent., and during 1871 and 1872 pyæmia and erysipelas became so frequent as to necessitate the clinic being closed.

How different it is to-day. The hospitals which twenty years ago numbered gangrene among their most frequent and disastrous complications of wounds, now never present a case for the observation of the student, and the majority of the younger surgeons scarcely know this disease.

The gravest operations now run a favorable course. "Fate" and "mishap" are terms no longer permissible. For the occurrence of suppuration the operator is directly accountable. The future of the patient rests in *his* hands.

We operate in youth and in the aged with the same assurance of a favorable result as that entertained in the robust adult of middle years. The abdomen and the cranium are opened without hesitation, and the visceral contents palpated or incised. We no longer believe that in a carcinomatous or tubercular patient a fresh wound is going to heal other than it would in a healthy individual. The theory of a *diathesis* predisposing to wound inflammation is a thing of the past.

For this enormous transition in surgical science, we are indebted to the illumination of the dark cloud suspended for so long a time over wound infection—to the revelation that in *living microörganisms* rests the danger. If the methods originally used were those now employed in combating the mighty enemy, then there would shine in more *brilliant light* the name of him who first showed us the way to progress—that of Sir John Lister.

But to Hunter belongs the original observation that subcutaneous wounds and simple fractures are unattended by suppuration; Lister comes *later* with the announcement that germs are the cause of infection, but claims that the infection takes place through the atmosphere. Elaborate "antiseptic" spray arrangements were accordingly for a time in vogue. Later investigations, however, proved that *the air* is rarely the medium of infection, that the natural *habitat* of organisms is *organic material* on the earth and elsewhere. Only as *dry dust* do germs get into the atmosphere. From moist surfaces they cannot arise.

The principal circumstances under which bacteria

are found in the air are, first, in winds and other forms of violent agitation of the atmosphere; secondly, in rooms after sweeping, and in enclosed compartments with defective ventilation and bad hygenic surroundings; and finally, they are present in the air of densely populated cities.

Here we may find bacilli and micrococci, in numbers varying from a few to many thousands per cb. cm.; while in the free open air, principally moles and the spores are present in limited numbers.

In mid-ocean atmosphere there are no germs present. Of this fact I convinced myself in a recent transatlantic voyage.

While still in the Shelda River and English Channel, and again on nearing Sandy Hook and sailing into New York Bay, occasional isolated colonies developed on exposed agar plates. In mid-ocean, between 5 and 40 degrees W. longitude, no germs at all were present in the atmosphere. This was also true of the air blowing from the iceberged Newfoundland banks. In the staterooms and in the first and second cabins of the steamer, on the other hand, many bacteria were found on short exposures, especially in the halls after dining hours.

In the steerage, where there were 1,100 emigrants packed together in filth, many thousand bacilli and micrococci came to luxuriant development on agar plates and in the large gelatine tubes.

The colonies in 3 to 5 liter aspirations were numerable only by Esmarch's graduated scale. Many of the bacteria thus isolated presented virulent characteristics as regards growth and development. I have made some inoculation experiments, but as these are not yet completed, I cannot now make further definite report.

The reverse of dryness, diffused daylight and sunshine, nature's anti-microbic resources, are all present in close packed compartments, like the rooms of a tenement house and the steerage, and hence the multiplicity of forms of infectious bacteria here present.

The recent incubation of a typhus fever epidemic on an emigrant steamer reaching New York quarantine, may easily be accounted for.

Naegali demonstrated theoretically, as long ago as 1870, that only through currents of air are germs taken up from their usual *habitat*—organic material, and that never do they rise from *solutions*, however rich in bacteria. In this fact we have a valuable practical suggestion as to the importance of the spray in diphtheria and other local infectious diseases, and also the aseptic efficiency of washing down the walls, spraying the atmosphere and sprinkling the floor of the clinic previous to operation—a practice executed daily by Leopold.

Moist air never contains anything like the number of germs which are present in a dry moving atmosphere. This factor, second to the absence of the prolific source, organic material, accounts for there not being any germs in the sea air and in the air of mountain tops. They are held down, in the one instance by the sea water, in the other by the snow covering the mountain peaks.

As evidence of the effect which stirring up the air has on its bacterial contents, Hesse found that the 3,000 germs to the cb. cm. present ordinarily in a school room, increased to 20,000 during the sessions, and to 40,000 when the pupils were marching out of the room.

Petri found the air of crowded stables to contain 30,000 bacilli and 7,400 mold spores to the cb. cm.

Very extensive has been the belief, both in medicine and with the laity, that the exhaled breath may convey infection.

But Tyndall demonstrated that the air expired almost never contains germs. Strauss found that in bacteria-enriched atmosphere, in hospital wards, of 600 germs inhaled, but very few were exhaled.

Cadeac and Malet conducted the expired breath of sheep, affected with anthrax and chicken-pox, through troughs ¼ to 3 meters long, having healthy animals inhale it; but notwithstanding repeated efforts, in no instance could the non-affected animals, placed at different distances along the trough, be made per inhalation to contract the disease.

The lungs do not give up germs from their moist alveolar surfaces. On the contrary, they filter out the microbes and purify the air bacteriologically, as well as with reference to carbon dioxide.

Only through the sputum or expectorated tissue particles, or through mucus secretion, can disease be communicated from the respiratory apparatus. As Strauss states, the respiratory function must tend to diminish the bacteria in an overcrowded auditorium. It may be a source of gratification to a lecturer to know that each listener brings with him a filter in the functions of his respiratory apparatus. With every breath about 500 cb. cm. of air is freed of its bacteria.

The more our knowledge of bacteriology has been extended, the less have become our fears of infection taking place through the air, and relatively unimportant is such possibility as compared with the dangers of direct contact of infectious materials.

Supposing a cubic meter of air does contain 1,000 to 20,000 germs, what is this, as compared with the half million to the cb. cm. present in river water, or the million or more contained in a single drop of pus or other highly contaminated fluid?

Repeated examinations in the von Bergmann clinic have shown that the number of germs which precipitate over an area of a quarter of a decimeter in thirty minutes of time, during the clinic hour, was at most but sixty to seventy, and as for pathogenic bacteria ever being present, it was an extreme rarity. Practical experience has long since demonstrated that the air is comparatively harmless, as regards its capability of infecting wounds.

It is the infection through contact which most engages our attention. To review the wound-infecting germs, we have first of all the erysipelas streptococcus of Fehleisen; second, the Nicolarer, Rosenbach, Kitasato, anarobic, tetanus bacillus, with its numerous ptomaines, "tetanin," "tetantoxin," "hydrochlorin" and "spasmotoxin," isolated by Brieger, capable of producing typical tetanic convulsions when inoculated even in infinitely small doses. Then we have the familiar staphylococcus pyogenes aureus, citrius and albus of ordinary suppuration, furuncle, carbuncle, paronychia, phlegmon, and nearly all the cases of pyæmia.

Fourth — the frequent cause of specially severe suppurative processes—the staphylococcus pyogenes, whose form and morphological characteristics so closely simulate the Fehleisen streptococcus of erysipelas that many bacteriologists claim them to be identical, differing only in location, representing a deep-seated and especially virulent form of the same disease.

Less frequent, as pus formers, are other cocci, for instance the micrococcus pyogenes tenuis (Rosenbach)

Very common, in excessive wound secretion, is the much discussed bacillus pyocyanus, or blue pus former. Anthrax, tubercle, glanders and diphtheria bacilli have for a long time been classed with those germs whose biological relations we thoroughly well understand. The causes of most forms of peritonitis, especially the perforative, have recently been found to be dependent upon two germs, whose *habitat* is the small intestine. They are the bacillus coli communis and bacterium lectis ærogenes.

We have also a special germ for septicæmia and severe necrotic processes. There remains now only one of the wound complications whose cause we have not discovered, namely: gangrene, the former scourge of hospitals and army life, but now swept out of existence; not even affording an occasional case for necessary bacteriological observation. We have in the subsidence of this disease a most brilliant triumph for aseptic surgery.

Finally, we have isolated the varied, destructive and often epidemic animal septicæmias, namely: the swine plague, wild game plague, chicken cholera, rabbit septicæmia and ferret plague, all of which present marked similarities, but differentiate themselves in the results of inoculation in the different animals.

To make practical application of the finding of germs, the first in surgical importance to us, is their presence on the surface of the body. Eberth, in 1875, first discovered that all imaginable forms of bacteria are found in normal perspiration.

We have on the skin all the factors conducive to the development of bacteria. First, there is the uniform temperature; second, moisture afforded by the excretion of the glands; and third, a culture medium is formed by the decomposed epidermis. The axillary space, interdigital folds and the hairy scalp, seem to be fertile soil for every possible form of microbe life. Miller found several varieties in the mouth.

We have here the, 1, lipothrix innominata; 2, bacillus bucallis maximus; 3, leptothrix bucallis maximus; 4, jodoccus vaginatus; 5, spirillum sputegnum; 6, spirochæte dentium; and four ordinary pathogenic bacteria, viz.: 1, micrococcus gingivæ pyogenes; 2, bacterium gingivæ pyogenes; 3, bacillis dentatis virides; and 4, bacillus pulpæ pyogenes.

Throughout the alimentary canal, in the female genital tract to the os internum, in the male urethra, in the upper respiratory passages, in the conjunctival secretion, and in the cerumen of the auditory canal, masses of bacteria are found. With the occurrence of a slight catarrhal process, the germs at once multiply with striking rapidity and number millions in a short time.

The cleansing of the surface of the body and the removal of the promiscuous forms of bacteria, many of which are pathogenic, constitutes the first requirement in asepsis. Not merely the skin of the patient in the region to be operated upon must be cleansed, but the still more infectious source, the hands of the surgeon. This disinfection is not an easy matter. The fat and dirt filling up the pores and epidermal folds in the skin contain a substratum rich in bacteria. A transitory submersion in the strongest sublimate solution has little influence. The fluid rolls in drops off the fat, glistening skin, without even thoroughly moistening it. In the skin and under the nails, the number of the bacteria remain practically unaltered after such a "*would-be disinfection.*"

Of course the absolute demand for a most careful cleansing of the surface needs no further argument. The method to be used may be formulated as follows: First, washing with soap and water as hot as can be borne, for one minute. Second, rubbing and drying the surface with sterile gauze. Third, one minute application of 80 per cent alcohol. Fourth, washing with sublimate solution. Ether in addition may be used where there is an unusual amount of dirt to be removed. The razor is most valuable over parts even not especially hairy, as it removes the superficial epidermal hairs, in which the bacteria aggregate. It cannot be applied so extensively to the scalp, but even here, the area should be shaved from 3 to 5 cm. from the margin of the wound.

An aseptic cleansing of the mucous membranes is less easily effected. Steffeek found that irrigation of the vagina with a liter solution 1 to 1,000 bichloride had not the slightest influence in reducing the number of bacteria. A stronger solution would of course be dangerous. Erosions and acute catarrh, or a general intoxication, might result from absorption. A mechanical cleansing of the rectal, vaginal and oral mucous membrane is to some extent practicable, by means of tepid sterilized water and gauze, or a physiological solution of common salt. The stomach is also permissible of free irrigation. Operations in emergency upon the intestine should be preceded by a preparatory course of catharsis.

All the articles and materials used in the disinfection of the surfaces cutaneous and mucous, must, of course, *themselves* be aseptic. The alcohol, ether and turpentine oil, only by careful handling are kept free from bacteria.

Eiselsberg showed in 1887, that *soap* may be very richly impregnated with microörganisms, and only that which has been boiled in the process of its manufacture should be used.

Most danger of all and the thing to which the least attention has been given are the *nail brushes*, used in removing blood, pus, surface epithelium and all forms of contamination, they naturally become more or less contaminated themselves; being moist, they retain most of the albuminous matter and form a most excellent nidus for germs. Schimmelbusch and Spielhagen in repeated examinations of the nail brushes, in clinics, dissecting rooms and laboratories found in them inestimable myriads of bacteria. That the brushes therefore, merits some attention must be conceded. Brushes in the von Bergmann clinic, are dealt with in the following manner: before being used, they are first, sterilized in steam for 30 minutes; second, they are kept continually submerged in $\frac{1}{10}$ corrosive sublimate. Third, after a special contamination, they are placed in very hot and finally in boiling water. In every commode should be placed an especially constructed enamel receptacle in which the brush can be continuously submerged in corrosive sublimate. The latter will maintain asepsis by preventing the development of bacteria after the brush has been sterilized in boiling water or steam.

Next in order the instruments themselves, will engage our attention. The impracticability of disinfecting them sufficiently, by means of antiseptic solutions is now clearly proven. The instruments must

be sterilized and the choice of method lies between hot air, steam and boiling water. Only the latter of these, will we consider. Spores of many bacilli resist hot air at 140° C. for two hours, and steam for forty minutes to one hour. While boiling in soda, insures *absolute death* of even anthrax, in three minutes. A special apparatus devised by Schimmelbusch, for this method of sterilizing instruments, together with other sterilizing apparatuses, will presently be demonstrated.

The especially commendable feature about this german sterilizer, is its economy of time; and if an instrument happens to drop during an operation, and one that cannot be well dispensed with, we are not obliged to wait for 40 minutes, while it is being sterilized. The instrument is at once thrown into the boiling soda, continually provided in the clinic by the above sterilizer, and in three to five minutes it is taken out aseptic.

Special stress should be laid upon the mechanical cleansing of instruments, as well as all things to be rendered aseptic. Pus, blood and masses of fat, the favorite niduses of organisms, must rigidly be dealt with, by washing with water, soap and brush, before they are put into the boiling soda. After use, they should be carefully dried with alcohol and dry sterile gauze. But with this method there is not the liability of rusting which follows dry heat and steam. Further the instruments are not corroded as with carbolic solution and sublimate. Solutions which even applied *concentrated* does not insure asepsis.

In the construction of the instruments, simplicity should not be lost sight of. All ornamentations and unnecessary fixings of every kind, are contra-indicated on grounds of asepsis. The one piece of steel, may enter into the formation of both the blade and handle, or the latter may be detachable. Instruments made of aluminium, lose one-ninth of their weight, by simply boiling for five minutes. Therefore this material is not to be employed.

Next of interest to us, are the *dressings* to be used, the first quality they should possess is the capability of rapid absorption. Second, they should not contain any bacteria. Third, they should work antiseptically in preventing decomposition of the secretions which they absorb.

Not the dressings which absorbs its maximum at once, and then becomes packed, and remains wet, but material which takes up the secretions gradually, as they are produced and dries out by evaporation, form the ideal dressing. *Sterility* the second prerequisite is absolute and applies to anything which is to come in contact with pure fresh wounds. Both Schlange and Löffler, have found factory gauze and bandages to contain many germs. The necessity of sterilizing the dressings, therefore, follows as a natural consequence. Steam in this instance, is the most efficient means at our disposal.

Schimmelbusch has invented an ingenious apparatus, which may be used for the combined purpose of an instrument and dressing sterilizer. The steam which has been generated in the boiling soda, is utilized in a chamber placed above for sterilizing the dressings. This combination answers admirably the requirements of the private practitioner. But for the more extensive usage of hospitals and amphitheatres, a *special* sterilizer for dressings is necessary. Then the Schimmelbusch apparatus recommends itself, or the Arnold steam sterilizer may be used. These, with another sterilizer for water, presently to be referred to, I have through the kindness of Mr. Wilmot Castle, of Rochester, N. Y., been able to place here, on exhibition, and will be pleased to demonstrate them to the gentlemen present.

The third requirement in dressings, is an antiseptic property. The prevention of the development of germs in the secretions of the wound which serves only too well, the purpose of a culture medium, being the indication to be met. I desire here to lay special stress upon the subject of dry dressing, as it is not in accordance with the usual ideas of wound treatment, as practiced by most surgeons. The more our experimental knowledge has been extended, the firmer has been the position gained by *dryness*, as a condition contrary to a germ development.

There is no remedy so harmless, simple and efficacious in preventing changes in the wound secretion, as dryness occurring of itself by evaporation. Moisture is the essential dependence of bacterial life. Dryness, on the other hand, is the germ's greatest enemy. Let the most favorable nutrient of bacteria, *moisture*, be dispensed with and the organisms cease to grow. Let then the absorption and drying out of the blood, pus and wound secretion be provided for, and the development of germs is *prevented*.

We are indebted to the Esmarch school, especially to Neuber, for having placed the importance of dry dressings in their present advanced position. Schlange in the von Bergmann Clinic, demonstrated by exacted bacterical experiments, how prompt dryness works against every form of germ life. Layers of sterile, gauze wire saturated with bullion and the upper surface impregnated with the green pus bacillis, then the gauze was placed in open glass plates; and evaporation and dryness took place, and only a very scanty development of the bacteria became perceptible. A logical consequence, and one exactly in accordance with organic life development in any form. Moisture is essential to growth. Instead of leaving the plates open, others of the same series were closed and evaporation of the moisture prevented. The pus formers now proliferated with enormous rapidity and soon formed a greenish film over the entire surface of the gauze. This suggests the practical advantage of facilitating to every possible extent, evaporations of the secretions from the wound.

First, the proper dressing material must be selected. Secondly, the evaporation must not be interfered with, by the interlaying of impervious material as oil silk, or gutta percha tissue. The latter, are of no special advantage, they prevent the wound and dressings from drying out, cause retention of the secretions, prohibiting even perspiration from the surface and inducing in the course of a few hours, the development of offensive odors, and very non aseptic conditions.

These facts are exactly in accordance with our laboratory experience as bacteriologists. As soon as the gelatin or agar tubes lose their surface moisture by evaporation, growth of the colonies cease, and the culture is lost. Hence the necessity of our *capping* the tubes, to favor the development of the bacteria—a procedure analogous to the application of impervious silk over wounds.

In the dressing then, we may combine a parasiticide influence, in *dryness*, an agent which will not injure the tissues locally, or cause general disturbance. It is not with bullion or water that we have to deal, in a

wound, but rather with *albuminous* culture material, which decidedly limits the action of chemicals. Further, evaporation of the carbolic and sublimate solutions, takes place, and combinations form reducing the effectual workings of these agents.

In sublimated gauze after a time, only an insignicant trace of the original antiseptic is to be found. The simple *dry treatment* of wounds, then, is the present position of surgical science, and is reinforced on all sides by logic and rational experience and results.

No oiled silk to promote retention of secretions, no chemicals to irritate the wound, no irrigation to carry germs into it, no pus. Only in two instances is anything additional to the simple dry sterile gauze needed. One is in the case of thick tenacious purulent discharge. The other is the tamponing of cavities, and the latter indication is admirably met in the iodoform dressing. Non-irritating and non-toxic (in reasonable quantity,) it prevents changes in the absorbed secretions. Notwithstanding the repeated attack made upon it, iodoform retains its place as prominently as ever as our most reliable dressing.

In the case of excessive purulent secretion, acetic acid, oxide, or chloride of zinc may be applied to the wound.

Since it has been shown, that raw cat gut is rich in bacteria, and Volkman had two cases of anthrax develop in a wound sutured with sheep ligature in which animal anthrax is common; further, by reason of Koch having demonstrated that antiseptics dissolved in oil, are ineffectual, we are now required by this progress in our science, to put ligatures and catguts also, through a course of sterilization.

Steam for the silk is the best method, and Schimmelbusch has given us a sterilizer consisting of a small box, containing several spools which can be placed in the steam chamber for thirty minutes, then closed and kept for use as desired. The ends of the thread protrude through openings at the side, so that raising the cover and permitting contamination is *obviated*.

With reference to catgut, the various methods employed are first, von Bergmann's ether sublimate and alcohol, McEwen's chromic acid, Lister's carbolic acid method, then Benkisser's Ravardin process of dehydration and deoleation, then disinfecting by hot steam.

Kocher sterilizes the catgut in juniper oil, Brunnes in Xylol. Of these various methods, that employed by von Bergmann is the one to be recommended, and may be briefly formulated as follows: First, the bottle is sterilized for three quarters of an hour in steam. Second is a process of deoleation, by placing the catgut for 24 hours in ether. Third, submersion in alcohol and sublimate of the following proportions: bichloride 10.0, absolute alcohol 800.0, aq. destillata 200.

The hermetically sealed bent tubes of Fowler, containing sterilized catgut, is also an efficient means of preserving this material aseptic.

The subject of wound drainage deserves just a passing notice. Three methods are embraced in the chapter. 1. The simple opening made through the tissues. 2. The use of drainage tubes. 3. The use of materials, capable of capillary attraction. Neuber advances the theory of an absorbable material so the wound can be closed. Trendelenburg and also McEwen used chicken bones, hollowed out. Bundles of catgut is Watson Cheyne's favored method. Then there are the old glass and gun drainage tubes. Probably the latter are the more satisfactory in the greater number of instances. They permit of being sterilized in boiling soda or steam. Five minutes of the former, 15 or 20 of the latter is sufficient to render them reliably aseptic.

They are preserved aseptic in a five per cent. carbolic acid solution, occasionally renewed. For fastening the tube in place, not the ordinary safety pin, but a sterilized silk thread passed with a needle, rendered aseptic, is to be employed.

The principle of capillary attraction can be utilized best in absorbing the discharges and wound secretion by means of the hydrophiline gauze. Absorbing pledgets for use in the operation are best supplied in the same material. Of course the gauze cannot be used but once, but we should not economize in the use of the materials applied direct to the wound but rather in the external dressing. Only gauze *scrupulously sterile* should be applied. Sponges while apt to be a source of danger, cannot absolutely be dispensed with, especially in operations about the mouth, resections of the jaw and in laparotomies. Absorbing so freely pus, blood and all fluids contaminated or not, they are, *a priori* apt to retain and convey infection and permit only with difficulty of being sterilized.

Anthrax spores were found in sponges, after being 14 days submerged in carbolic acid. The ordinary organisms live for eight days. Twenty per cent. of the sponges prepared for use in the Billroth Clinic were found by Friesch to contain bacteria. The method of preparation of the sponges, employed by Schimmelbusch, consists first in washing them thoroughly in hot water, removing carefully all foreign substances. After several rinsings they are boiled for 30 minutes in 1 per cent. soda solution, then preserved in strong corrosive sublimate. Of course they must be enveloped in gauze, so that the fingers will not come in direct contact with what is to find application perhaps in the abdominal cavity. This method can be regarded as *absolute*. Sponges impregnated with pus and anthrax spores did not react to culture efforts after ten minutes in the boiling soda.

For a continuance of this subject in the "Septic Dangers of Hypodermic Injection, Catheterization and Irrigation of Wounds, the reader is refered to a paper by the writer under the above title published in the *Medical and Surgical Times*.

610 Main St., Buffalo, N. Y.

THE COSMETIC SURGERY OF THE NOSE.

Read in the Section of Surgery and Anatomy, at the Forty-third annual meeting of the American Medical Association held at Detroit, Mich., June, 1892.

BY JOHN B. ROBERTS, M.D.,

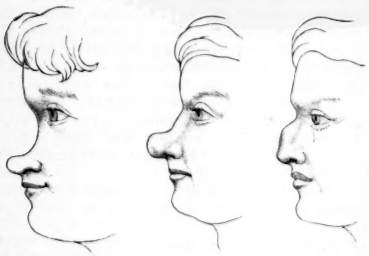
PROFESSOR OF SURGERY IN THE PHILADELPHIA POLYCLINIC AND IN THE WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA.

Operative surgery can do so much to relieve disfiguring nasal deformities that perhaps the topic will prove interesting for discussion at this representative meeting. The medical profession fails to fully realize that nearly all undesirable distortions of the nose can be improved or entirely corrected by cosmetic operation. It is, therefore, not astonishing that many persons remain in constant unhappiness because of the consciousness that a congenital or accidental

disfigurement is the occasion of impolite stare or impertinent remark.

Operations, often quite trivial, change noses notable for ugliness into organs of symmetrical lines. Such cosmetic improvement naturally makes the patient happier in mind; and not infrequently improves physical health as well, by restoring the normal respiratory and vocal functions of the nasal chambers. Even when more extensive, such operations, if properly performed, carry with them no risk to life. Hæmorrhage of serious kind and violent inflammation are practically unknown; and unseemly scarring does not occur to be an impediment to radical surgical work. Much can be done to the nose, through the nostrils or mouth, without making an incision in the skin of the face. Cuts on the cutaneous surface are inconspicuous, or even invisible, when made in selected spots and with oblique division of the tissues, and when so treated that primary union is secured. Such incisions should be made in the normal lines of the skin, not across them, or should be placed in the situations where shadows, rather than strong lights, usually fall. Careful asepsis or antisepsis, oblique incision of the skin, fine catgut sutures and iodoform with collodion as a dressing insure unnoticeable scars, even when the incisions are made in less desirable sites than those just mentioned.

The recognition of tertiary syphilis of the nose and the recollection of its frequency among the educated and refined are requisite qualifications for the



Saddle-back nose. Tuberous nose. Angular nose.

successful practice of this branch of general surgery. Many deformities, due to inefficient management of such curable lesions, have come to me for operative treatment. That physicians allow such disfigurements to happen is very astonishing. It should be a rule of practice to give all patients with stationary or chronic ulceration of the interior or exterior of the nose, full doses of mercury and iodide of potassium. The therapeutic test carried on for ten days will usually clear up doubtful cases, if sufficient doses of these drugs are given. A third or a half of a grain of green iodide of mercury taken before meals, and twenty to thirty grains of potassium iodide taken after meals will cure many ulcerated noses. It is the neglect of this active treatment that furnishes the most frightful disfigurements that fall into my hands for cosmetic procedures.

It is useless to detail fully here the causes which may give rise to nasal deformity. Congenital imperfections, such as epicanthus and the flattened and dilated nostril accompanying hare-lip can usually be greatly improved. The Roman nose, the Jewish nose and the nose with an angular prominence on its dorsum can, in many instances, be satisfactorily modified by careful chiseling away of the angular projection of bone and cartilage.

Here a single incision along the edge of the dorsum allows the surgeon to stretch the skin open, so as to apply a sharp chisel to the whole breadth of the nose and shave the bridge into a becoming shape. I have found that the chisel often does best work when used with the beveled side of the cutting edge toward the bone.

Fractures make, of course, all forms of irregularity, and may be accompanied by such blocking up of the nostrils as to require quarrying with chisels and burrs to open the air passages.

I have seen ugly twists given to the cartilaginous nose by what seems to be an interstitial over-growth of the triangular cartilage of the septum. As this cartilage abuts against bone above and below, such over-growth causes marked curves in its outline, which secondarily displaces the cartilaginous portions of the external nose, giving it an ugly twist.

Twisted Nose.

Efficient treatment of this abnormal shape of the organ must include excision of a considerable portion of the septal cartilage. Sometimes, but not always, this may be done by sub-mucous resection.

Tumors involving the tip of the nose can readily be removed by a V-shaped incision; the nasal lobule is afterwards reconstructed by bringing the flaps together in a judicious manner. The fact that the nares are laid open by the incision makes no difference. The wound can be protected from septic infection by thoroughly cleansing the mucous membrane before operation, and plugging with antiseptic gauze after operation.

The improvement in the patient's appearance made by excision of tubercular excresences of the nose due to acne is most astonishing. Yet, many patients go through life with these deformities, never knowing their remediable character. An insignificant operation will cure promptly the horrible and often disgusting disfigurement. Tumors involving the alæ will often require the surgeon to construct a new ala from the cheek after excision of the growth.

Bent Nose.

Syphilitic destruction of the bones and cartilages give us the most difficult cases to remedy because of the actual loss of substance. If the external tissues are intact, however, great destruction of the internal parts of the nose may be successfully neutralized. I have satisfactorily used the tissues of the forehead and upper lip for making a bridge and a columella respectively. In a somewhat

similar manner I have propped up a sunken bridge in fracture by turning up a flap cut from the septal cartilage and changing its direction. Chiselling loose the nasal bones and pinching them together towards the middle line will elevate the bony dorsum in saddle-back nose, and by narrowing it at the same time, give it a relative height which will lessen deformity.

A Form of Syphilitic Nose.

After syphilitic ulceration of the internal structures, the external soft parts are often drawn into the nasal cavities by cicatricial contraction and respiratory suction. To elevate and to keep elevated the external nose, so as to restore the nasal projection and facial conformation, is sometimes quite a problem. If the alæ are pared from their abnormal deep connections, by means of a tenotome freely used through the nostrils, the cutaneous and subcutaneous tissues can be unfolded and drawn out so as to reconstruct the nasal elevation. There may not be sufficient rigidity in the tissues, however, to keep them in the desired position; and if the bony bridge has been destroyed, the problem is more difficult. It has been proposed to dissect up the nose by an incision from within the mouth, under the upper lip, and to insert a metal bridge or support. This can doubtless be done with success. I have accomplished a good deal with plugs in the nares, used until the new position was confirmed; have used spectacles of special construction to pinch up the soft tissues into a bridge; and have employed plastic devices with much satisfaction.

The straightening of crooked noses can be accomplished only after very free separation of the cartilage and skin from the nasal and superior maxilliary bones. This is best done with a tenotome passed into each nostril in turn. With it the mucous membrane is pierced and the tissues freely cut away from their bony attachments. The septum is then divided by knife or saw, and the nose forcibly bent into the straight position. A great deal of force should be applied so as to twist the parts completely out of their abnormal relation. It is always well to over-correct the distortion because there will be a tendency of the old condition to return. If the nose is bent to the right, the surgeon should give it a marked twist to the left of the middle line, and similarly to the right in left deviations. After this has been done, steel pins, one and one-half inches long, are thrust through the skin just below the nasal bones, and through the columella at the margin of the anterior nares, and used as levers to hold the nose in its corrected position. The pins should be retained about ten days or two weeks.

I have not considered the more elaborate procedures for reconstructing new noses from the arm, finger and forehead, nor gone into the present topic in great detail, because this paper is only suggestive. A consideration of all the operations of a cosmetic nature practicable upon the nose would make this communication much too long. I have, moreover, in another place, discussed many matters pertaining to this branch of surgery ("The Cure of Crooked and Otherwise Deformed Noses," Philadelphia, 1889). At this time I especially desire to call the attention of the medical profession to the fact that much can be done to aid sufferers from nasal disfigurements, and that those with bent, twisted, angular, tuberous or syphilitic noses should be given to understand that the condition is capable of great cosmetic improvement. The surgeon must use in this work his knowledge of plastic surgery, and adapt his operation to each individual case. Much more can be successfully done, in an operative way, to the nose than is usually believed.

THE SIGNIFICANCE OF AN HERNIAL SAC.

Read before the Section of Surgery and Anatomy, at the Forty-third Annual Meeting of the American Medical Association, at Detroit, Mich., June 7, 1892.

[The name of the author does not accompany this paper.]

Hernia is full of interest; is fraught with imminent danger, and may come when least expected.

Modern progress has given a new impulse to early diagnosis. To recognize hernia in embryo is to anticipate all its perils. Hernia and sac seem indissoluble. Unhesitatingly the student of medicine associates the two. In whatever situation it occupies, a hernia is composed of a sac and contents. Practically this teaching is just a little misleading. For years past it has been my aim to impress my class with the importance of early diagnosis, that is, diagnosis before the formation of a sac, for with the sac come as probabilities all the calamities incident to the infirmity, viz.: inflammation, irreducibility, incarceration and strangulation; disasters embodying the significance of an hernial sac. The palliative cure of hernia is the permanent vacation of the sac; the radical cure, the extinction of the sac. Apathy on the part of the patient together with absence of intelligent solicitude on the part of the physician permits the formation of a sac, thus entailing all its incident hazards.

All mankind are, in the nature of their anatomy, predisposed to hernia, differing the one from the other simply in degree. The fibre of some men is short and tense; of others, long and lax. The abdominal wall is weak at certain points in all. The common habits and necessities of life impose oft repeated diminution of the capacity of the abdomen; but most of all feats of agility, such as jumping, lifting heavy weights, etc., test out the weak places, when points of least resistance necessarily bulge. Tenacity and elasticity of tissue in the standard organism may reinstate all, but there is a limit. The combined forces of the abdominal muscles concentrate against the feeble points of the parietes, the equilibrium is lost, a sense of weakness is felt, and the necessity for support is immediately experienced. All the organs alike, even those most distant, as well as those most fixed by mesenteric folds are forced towards the hernial sites. The cæcum has been found in an umbilical hernia, in an inguinal hernia on the left side. Anatomical knowledge alone would never have led us to entertain a suspicion of the possibility of these occurrences, but facts warrant the inference that there is no necessity for supposing elongation of the visceral ligaments a predisposing cause of hernia.

The ligaments of the liver, those of the spleen and the various membranous bands of the intestines in general, would be but feeble means of fixing such parts in their respective situations were it not for the fact that the abdomen is always completely full. The containing and contained parts react upon and reciprocally compress one another. It is by the effect

of this moderate but equal and unremitting pressure that all the viscera mutually support each other. Doubtless the ligaments became stretched and permanently elongated as the result of repeated or continued descent of the intestines; but we are not cognizant of any facts to prove a congenital condition of the kind above alluded to. At first sight this circumstance regarding the elongation of the mesentery may seem to have very slight practical value, and that the cause of hernia is rather in a want of equilibrium between the pressure of the viscera and the resistance of the abdominal parietes, yet persons in whom an hernial sac exists, state that they are most troubled with the descent when out of health, when generally relaxed. If it be an anatomical truth that an elongated mesentery is a preliminary to hernia, the radical cure should begin by abridging it. Certainly the determining condition of hernia seems to be the relative preponderance of the predisposing and existing causes.

Practically the most important period in the progress of hernia is when weakness is felt and slight fullness is observed in the hernial site. At this period the parietal peritoneum pushed before the protruding viscus has a conical shape, therefore strangulation would seem to be impossible. Soon, however, the peritoneum so protruding reaches the connective tissue beyond the tendinous rings, there being less resistance it expands into a rounded shape when that portion corresponding to the resisting rings is relatively smaller. Now for the first time a sac appears, when strangulation is possible. For a time after the hernial sac acquires a neck, body and fundus, the neck is puckered within the grasp of the tendinous rings; if at this time the protruded peritoneum is returned, the puckering disappears, thereby effacing the orifice of the sac, cure being complete. If at this period strangulation occur, the nip is at and by the tendinous borders. At a later time the orifice of the sac itself takes on organization which sufficiently explains all the phenomena of which it is the focus.

The period prior to the organization of the sac is, as we have written, the most important in the history of hernia. For a time, even if the tumor be quite prominent, the neck of the sac is only folds of peritoneum which are readily obliterated on the reduction of the mass. Later the peritoneal plaits adhere, the orifice of the sac becoming an independent structure, or a permanent and distinct organ, annexed to the peritoneum. From this moment the orifice has an evolution peculiar to itself, becoming the seat of remarkable changes. The serous surfaces are not alone the seat of the action relating to the organization of the orifice, for subserous connective tissue changes of no less interest take place. The adipose tissue disappears although the person be fat. The connective tissue is transformed into an highly vitalized, vascular structure, changing later into a fibrous layer which interlacing in every direction comes to resemble the dartos. This dartos-like layer having contractile properties may play its part in obstruction and strangulation, certainly this dartos structure accounts for the constant tendency to contract which characterizes the orifice of the vacated sac, as well as the tendency to obliteration after herniated organs cease to act upon it. The contractile quality of the sac tissue which promises so much in the direction of cure provided the prolapsed organs are kept up is a constant menace when precautions are neglected. Incarceration, inflammation and strangulation are penalties annexed to inattention to the truss. From the moment a hernial sac is evolved begins the formidable array of disasters which constantly beset the victims of hernia. Again, the dangers increase apace till the offending organ is obliterated by its own contraction or removed by surgical aid. Early diagnosis of hernia, the prevention of sac, seems the only solution of the difficulty. The practicability of this most important point is the question. To engage the coöperation of the patient and to awaken the profession to the importance of early attention is the only hope.

The diagnosis of hernia is quite as easy at an early period as later; the symptoms the same, differing only in degree. The same subjective and objective signs, the sense of uneasiness, the feeling of weakness, the impulse on succussion of the abdomen, the comfort of recumbency and aggravation on assuming the erect posture, the surgeon readily demonstrating to himself the opening through which the protruding parts play.

Unfortunately we think of hernia as an established infirmity, sac and contents always in our minds. We would shift the interest in this subject to the period anterior to the formation of the sac, when the disease is new or just developing. We would have hernia recognized before it has grown old, an exaggerated form of disease. If early diagnosis is so important to the success of a surgical operation, how much more important when early diagnosis anticipates the necessity of an operation, nay more, prevents the disease, the surgeon by a simple mechanical contrivance restoring the patient. Unfortunately the surgeon does not see cases of hernia till the sac is perfected. The neglect of the patient and the want of intelligent concern on the part of the practitioner at a sufficiently early period fortunately or unfortunately furnish the data for the larger portion of surgical literature which is the boast of our profession.

Preventive medicine is the goal. A knowledge of causes and their apprehension must however be the aim to the end.

Agencies of injury and disease once established, the relative impotency of our art becomes a painful realization.

THE Mississippi Valley Medical Association will hold its eighteenth annual session at Cincinnati, Wednesday, Thursday and Friday, October 12, 13 and 14, 1892, under the presidency of Charles A. L. Reed, M.D., Cincinnati. An excellent programme, containing the best names in the valley, and covering the entire field of medicine, will be presented. An address on Surgery will be delivered by Dr. Hunter McGuire, of Richmond, Va., President of the American Medical Association. An address on Medicine will be made by Dr. Hobart Amory Hare, Professor of Therapeutics and Clinical Medicine, Jefferson Medical College, Philadelphia. The social as well as the scientific part of the meeting will be of the highest order. The officers of the Pan-American Medical Congress will hold a conference at the same time and place.

THE next meeting of the Kansas State Society will be held in Topeka, in May, 1893.

THE
Journal of the American Medical Association
PUBLISHED WEEKLY.

SUBSCRIPTION PRICE, INCLUDING POSTAGE:
PER ANNUM, IN ADVANCE $5.00
SINGLE COPIES . . . . . 10 CENTS.

Subscriptions may begin at any time and be sent to
THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION,
No. 68 WABASH AVE., CHICAGO, ILLINOIS.

All members of the Association should send their Annual Dues to the Treasurer, RICHARD J. DUNGLISON, M.D., Lock Box 1274, Philadelphia, Pa.

MEMBERSHIP IN THE AMERICAN MEDICAL ASSOCIATION.

This is obtainable, at any time, by a member of any State or local Medical Society which is entitled to send delegates to the Association. All that is necessary is for the applicant to write to the Treasurer of the Association, Dr. Richard J. Dunglison, Lock Box 1274, Philadelphia, Pa., sending him a certificate or statement that he is in good standing in his own Society, signed by the President and Secretary of said Society, with five dollars for annual dues. Attendance as a delegate at an annual meeting of the Association is not necessary to obtain membership. On receipt of the above amount the weekly JOURNAL of the Association will be forwarded regularly.

SATURDAY, AUGUST 20, 1892.

TWO MISTAKES.

A prominent professor in a recent address, asserted positively, that mistakes by the modern physician were always personal reflections on his training and judgment. This recalls two remarkable cases never published, that are wide exceptions to this strange assertion.

Over thirty years ago a warm controversy was carried on by the leading surgeons of this country, on the question of union from fracture of the neck of the femur. Intra-capsular fracture was considered never to heal by bony growth. All the cases which seemed to prove the contrary were considered partially within and without the capsule. Specimens to prove either side of the question were sent for examination to all leading surgeons, and opinions were given freely. Exhaustive papers were read and debated in the societies. The leading surgeons who believed in bony union within the capsule procured a very remarkable specimen, at the London University Hospital, which was submitted to all the leading London and Paris surgeons, and declared to furnish conclusive evidence of fracture and bony growth within the capsule.

This and other less marked specimens were examined by the surgeons of this country, and accepted as proving the fact, by the most critical opponents. The controversy seemed settled, when a country physician who was examining the specimen, recognized a disparity of weight compared with other similar bones. A closer study revealed a plaster of Paris head joined to the bone, so ingeniously as to escape the most critical examination. This specimen had been studied by over twenty of the leading surgeons of the world, and its external appearances had been accepted as unmistakable proof of bony growth of intra-capsular fractures of the neck of the femur.

Why these surgeons had not discovered this fraud was a mystery. Many of them were, and are yet the great fathers of medical science, whose names and works will live far down into the future.

The second instance is more modern. A nervous Irish girl had intercourse while coming to this country. A few months later she exhibited many signs of pregnancy, and was ruthlessly turned out on the street. A young doctor of wealth and leisure became convinced that it was not pregnancy, and accordingly had her examined by many leading specialists, each of whom differed with him. He then took her to some of the leading authorities of the great medical centers of the country. The diagnosis of all was pregnancy, with some obscure complications. Finally the girl died from peritonitis, and a post-mortem revealed nothing, with no indication of conception or change of the uterine walls. The only possible explanation was that most of the symptoms were mental, and in support of this it was ascertained that the girl had read in a handbook of medicine the various symptoms of pregnancy, and firmly believed she was in this condition. The peritonitis of which she died was of the same character. Thoroughly trained physicians in active practice fully recognize the possibility of mistake and error in the diagnosis, and are never dogmatic; and are also slow to condemn any one who has formed a wrong opinion.

Therapeutical differences of opinion are a part of the individuality of the man. Differences of diagnosis date from the perception and power of reasoning, together with experience, memory and training. Of necessity it will vary widely, especially if any obscurity or complications of symptoms are present. One of the most eminent London physicians had a clinical clerk who recorded all the facts of the case, which were read over at leisure and studied before an opinion or diagnosis would be given.

Physicians should exercise the same caution and care in forming opinions that judges display. Occasions rarely occur in which time cannot be taken to study and consider the meaning of the symptoms. It is no mark of greatness to be able to diagnose the case at once, or in the popular sense see through the case at a glance.

It is no sign of ignorance or incompetency to fail to understand the case. To teach students that positive diagnosis can be made in all cases is an error. The rapid increase of means and appliances for ascertaining facts of disease and diseased conditions require more study and training, and capacity for deductive reasoning. The older physician who makes a diagnosis often by mere intuition, may be quite as accurate as the younger man with a vast array of facts from instruments of precision. In one case we can follow and correct such reasoning, but in the other we cannot. CARLYLE said mistakes and errors are inseparable from every human being, irrespective of all conditions. No field of thought requires more

accurate perception and critical reasoning than that of medicine. The judge realizes that his opinion and the facts on which it is based will be reviewed by others, and it is a matter of personal pride to be correct. In a higher sense the judgment of the physician should be sustained by the progress and history of the case. A court of last resort will finally pass on his judgment, beyond the selfish levels of pride and personality.

THE LOCALIZATION OF TUBERCULOSIS IN THE HERNIAL SAC.

One of the most interesting examples of the localization of tubercular infection has been brought to our attention through the very novel contribution of LOUTHAM in the *Medical Chronicle* April 1892. In one case a consumptive had a large scrotal hernia which was found on operation to be irreducble from tubercular peritonitis in the sac. The sac and testicle were removed together with complete recovery. In the second case a six year old boy without evidence of tuberculosis elsewhere was operated on for hernia. The sac was found covered with milliary tubercules and it was extirpated high up with prompt recovery.

BRUNS[1] has lately studied thirteen cases of tuberculosis in the hernial sac. Of these seven were recognized as primary, while the remainder were simply part of a general peritonial tuberculosis.

It must then be concluded that primary (so called) tuberculosis of the hernial sac is simply a secondary focus. The localization of this focus depends on a diminished resistence in the hernial sac, due to mechanical causes. The primary focus being probably in the pulmonary side of the circulation.

The treatment of these cases is to be determined by the experience found in general peritorneal tuberculosis. Tuberculosis of the sac is not a certain indication to the radical operation. It calls for the complete extirpation of the sac and iodoform medication. It is not a certain indication to operation in a general tuberculosis. The recoveries in the fifteen cases now reported are encouraging.

ELECTRICAL EXECUTION.

Another electrocutive experiment has been successfully carried out in New York State. The period of contacts was thirty-seven seconds; twelve, ten, eight and seven seconds for the four applications. There was no burning of the flesh and no great muscular contraction during the contact. There were no disfigurements found after death as a result of the contact of the electrodes. The electrical current used was equal to 1,560 volts at seven ampères. The date of this last, and least objectionable electrocution was August 2, and the place was Clinton prison. The disagreeable features of this form of judicial death have been reduced to a minimum, in the light of the earlier experiences, especially last year at the Sing Sing prison. All public clamor against the method may be said to have been effectively stilled, for the present at least. Now it remains to be seen if other States will adopt the measure, in next winter's legislatures.

[1] Tuberculosis herniosa Beiträge zur klinchirosgie Bd. IX.

EDITORIAL NOTES.

NEW YORK CITY AND ITS CROTON WATER.—The *New York Medical Journal* remarks editorially on the deterioration of the croton water. In its unfiltered stata, its color and odor are not such as would inspire confidence. Albuminoid ammonia is reported by the official chemists to show a decided increase, while the presence of vegetable matter in excess is revealed by the microscope. If this condition persists a reported increase in cases of enteric fever must be expected among those who use unfiltered and unboiled water.

HEADACHE TREATED BY CHLORALAMID.—The following formula, for the treatment of headache and insomnia from exhaustion, has been recommended by Gallani in *Medicine Moderne:*

Chloralamid, 30 grains.
Hydrochloric acid, dil., 5 drops.
Syrup, 2 drachms.
Distilled water, 2 ounces

Fifteen grains is the dose recommended, to be repeated, although thirty grains would probably be prescribed by some others who have had an experience with chloralamid as a hypnotic. Cold water should always be used in making this and similar solutions, since the drug is decomposed when hot water is used. By the addition of a little alcohol or spirituous liquor, in which the drug is readily soluble, the successful preparation of these solutions is ensured. The subcutaneous injection of a four per cent. solution of chloralamid has been found efficient against insomnia and abdominal pain, such as alleged "hepatic colic" and secondary neuralgia due to carcinoma of the rectum.

LIFE INSURANCE WITHOUT MEDICAL EXAMINATION.—It is stated that three London companies have so modified their rules that those applicants who desire to avoid medical examination, can do so by the payment of a specially arranged scale of premiums. The same step has been under consideration by several of our American companies, with the result of declining to go into the venture until the success of the British companies shall have been proven.

THE *Chicago Medical Recorder*, edited by Dr. Archibald Church, and previously published by W. R. Keener of Chicago, is now being published by the M. H. Kaufmann Medical Publishing Company.

DOMESTIC CORRESPONDENCE.

To the Editor of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION:

Your editorial in THE JOURNAL of Aug. 6, entitled "The Surgeons at Homestead" is misleading and calculated to cast censure upon worthy men, engaged in the discharge of a most unpleasant duty.

The punishment inflicted upon Private Wm. L. Iams, Co. K. 16th Reg., for shouting "Three Cheers for the man who shot Frick" was not greater than the offense merited. All, good, law-abiding citizens who are conversant with the facts, and with the lawless spirit which pervaded the community

at Homestead, at the time of the strike, and the danger of this same spirit extending to the soldiers, acknowledge the truth of the above statement. And the fact that Lieut. Col. Streator was last night unanimously, re-elected Lieutenant-Colonel of his regiment proves that this is also the opinion of his brother officers.

Private Iams had proven himself, on former occasions, to be a bad soldier. At Moreland, two years ago, he was punished for insubordination. At Kensington, one year ago, he was again punished for breaking through the guard. At Homestead on Thursday (two days before his last treasonable conduct) he had slept on his post, and on Friday was punished by being compelled to carry a log on his shoulder. On the next day (Saturday) when our whole community was shocked by the murderous attack upon Mr. Frick, this same man stood up in his tent, and shouted "Three cheers for the man who shot Frick." This in the presence of our citizen soldiers. It is much to their credit that the remark was received with indignation. Iams was asked to recall the expression which he emphatically refused to do, and it was then that the order was given "that he be tied up by his thumbs, and that the surgeons stand by, and see that no harm befel him." In the army, or elsewhere, when punishment is administered to a culprit, it is customary, as it is humane, to have a physician present to see that the punishment is not carried farther than the criminal is able to bear. The tieing up of a soldier by the thumbs, is a mode of punishment which has been sanctioned in the army by long usage. In the case of Iams the surgeons were ordered to stand by and see that *no harm befel him*. This they did. They saw to it that he could stand in such a manner that he could take all the weight of his body, when he so desired, upon his feet. They counted his pulse, and watched his respiration, and when in their opinion he began to show symptoms of being physically injured, they ordered the punishment stopped. Surely there was no cruelty or brutality exhited by the surgeons.

In your JOURNAL you say, "it is not the province of this JOURNAL to discuss the action of the Colonel in ordering the punishment which he did. But the actions of the surgeons becomes a fit subject for discussion by the medical profession. It is generally admitted that medicine is the healing art, and that the great duty of the physician is to relieve pain, and not to inflict it, except it be for the purpose of saving life, or cutting short other suffering." Again, you say, "we care not what military law may be, *it was the duty of those surgeons to as medical men, to refuse to carry out the orders of the Colonel, to tender their resignations on the spot, if necessary, or even to suffer punishment for insubordination.*

These remarks would have some little pertinence, if the surgeons had been ordered to inflict the punishment, but they were not so ordered, they were only ordered "to stand by and see that no harm befel the culprit." Surely so far as the surgeons were concerned this was in the direct line of their duty. To have refused would have been to be untrue to their office, to the medical profession and to the culprit. All of the actions of the surgeons were on the side of humanity. Being personally acquainted with the surgeons at Homestead I can vouch for their ability as surgeons, and character as men. They knew their duties, and are incapable of doing any act of cruelty. There is a maudlin sentimentality in the community in regard to criminals and their punishment, which, unless checked, will destroy all law and order.

Iams deserved the punishment which he received and the surgeons at Homestead, should have been commended, instead of being censured for the manner in which they discharged a most disagreeable duty. J. B. MURDOCH.

Pittsburgh, August 10, 1892.

In our reference to the surgeons who were present at the time of the punishment of private Iams, we fairly reflected the sentiments of the people as shown by many columns of comments in the current press. In no way do we justify Iams for his senseless and perhaps criminal act, but as war did not exist and the town of Homestead was not under martial law, and the regiment one of citizen soldiers, under orders to preserve the peace, the offense was not of the grade to demand such a sentence without a trial by court martial. The conditions were extremely exasperating, and should have been an occasion for the exercise of a cool judgment, rather than the autocratic power of an impulsive despot, which placed the surgeons in an unpleasant dilemma. A refusal to obey the command of a superior officer in the army is a most serious breach of military discipline.

Duty to obey an officers order, which involves such severe physical punishment as to require a surgeon to take a professional part in executing the sentence, is questionable. This is undoubtedly the case, where the culprit has had neither semblance or pretense of trial, in a time of peace, and is certainly an occasion to call for a protest not only from the surgeons immediately concerned, but from the profession at large.

After the associated press report of this unfortunate affair the *Medical Review* comments as follows:

Such is the story which is told. Eminent legal authority claim that the punishment was not only uncalled for, but unjustifiable and illegal. We have nothing to do with this phase of the question. Whether legal or otherwise, the surgeons had no moral right to act in the position of *participes criminis* in a torture whose equal can only be found in the annals of the Inquisition. The medical officers degraded their profession to the extent of not only countenancing such an infamous act, but of watching the miserable victim to see how much torture he could bear. They felt his pulse and watched his heart until he was limp and apparently unconscious. They did not have the manhood, much less humanity, to protest with the brutal Colonel against such unheard of punishment. These are the men to whom delicate women and puny children are to be confided! These are the kind, ministering angels who are to smooth the pillows of the afflicted and assuage the pains of the diseased.

We have more respect for the American Indian after this. The Chinese torture as a custom can no longer be revolting. These people have been educated to their peculiar methods, and only employ them on their enemies or on criminals of the deepest dye. The medical officers of the Tenth Regiment Pennsylvania National Guards watch a fellow man and citizen suffering the tortures of the damned to please a Colonel who should be relegated to a position where he could be watched by a Humane Society.

In whatever light this outrage is looked upon, there is no excuse for it. But the greatest dishonor, the greatest obloquy and shame is surely deserved by the self-styled physicians who could so degrade, so besmirch their profession as to drag it in the mire as they have done in the case of Private Iams. The incident will remain a lasting monument to the disgrace of medicine, more especially of American medicine, and it will take much to wipe out the stain which has thus been placed upon a large, honorable and humane body of men.

The editor of the *Lancet-Clinic* says:

The present trouble at Homestead has been prolific in producing unpleasant and painful spectacles; but it seems to us that there has been nothing so barbarous as the punishment inflicted upon the soldier who dared to suggest the propriety of giving three cheers for the assassin of Mr. Frick. From a perusal of the account one would almost be led to the belief that the days of torture and thumb screws had not passed away.

While we cannot sympathize with the sentiment of the man who desired to applaud attempted murder, much less do we sympathize with the brutality of tying a man up by the thumbs until he faints. Such barbarity should have no place in a civilized community, and the Colonel who ordered such punishment has disgraced his manhood and shown himself a bully and a tyrant. Further than this, we do not

believe that legal justification for this act could be obtained from any right-minded judge.

The medical men figured in a very unenviable light in this affair, and the part they assumed is a degrading one for any member of our humane profession to undertake. We are sorry they allowed themselves to act as torturers to his majesty, the Colonel of the regiment, and believe that a second sober thought will convince them that they allowed themselves to be made parties to a despicable and cruel punishment. Doctors, we cry shame upon you!

SELECTIONS.

VENEREAL DISEASE IN PARIS AND BRUSSELS.—Among 2,941 registered prostitutes in Paris, arrested for various reasons in 1891, 251 were found to be suffering from veneral disease. Of 2,637 clandestine prostitutes arrested under similar circumstances, 1,153 were infected. The proportion of disease was therefore about 8½ per cent. among the registered women, as against 43 per cent. among the clandestine prostitutes. In Brussels, where the regulations are very strict, the proportion of disease is somewhat less among the registered women, but among the clandestine prostitutes it has recently increased to such an extent that an additional ward has had to be opened in the St. Pierre Hospital for their reception.

FEMALE PHYSICIANS AND THE BRITISH MEDICAL ASSOCIATION.—According to the *British Medical Journal* for July 30th, a resolution was passed at the recent meeting of the British Medical Association at Nottingham, expunging a section of the articles of association that provided that no female should be eligible for election as a member of that association. The question was first agitated in 1878, when it was decided, by a large majority, to make no change. This recent action reflects credit on the association.

THE TREATMENT OF CHRONIC SUPPURATIVE OTITIS. By Dr. H. Gradle, Chicago.—His observations are based on about 600 cases, and from a careful study of the results of treatment he formulates the following conclusions: "As long as the pus of otorrhœa smells fœtid, the treatment employed has exerted no curative influence on the disease," and conversely "the first sign of curative influence of any treatment upon the course of an otorrhœa is upon the odor of the discharge." To test for the odor, the meatus is mopped out with cotton on a probe, and the surgeon smells what is removed. He then recommends thorough syringing and the application of some form of antiseptic, such as boric powder, and on the following day to again test for the smell; and if the odor persists, the continuance of the same form of treatment will prove of no benefit. Unless the stagnant pus be thoroughly removed, the use of boracic acid or any other disinfectant cannot make the discharge odorless. The necessity of thorough cleansing of the meatus, tympanum, Eustachian tubes, etc., is insisted upon as being the first essential, and next the application of an antiseptic in such a condition that it can freely enter the various crevices. —*Archives of Otology*, 1892.

ANTRECTOMY AS A TREATMENT FOR CHRONIC PURULENT OTITIS MEDIA. By W. Arbuthnot Lane, M.B., London.—Here Mr. Lane emphasizes the fact that the antrum has no anatomical or physiological relationship with the mastoid process or its cells, but that it is situated in the petrous bone, and is, physiologically and anatomically, a part of the middle ear, and that it plays a very important part in the pathology and causation of chronic purulent otitis media. He opens the antrum by the use of mallet and gouges, then scrapes the cavity with sharp spoons. Subsequently he removes overhanging bone, so that the gouged inner wall of the antrum is the apex of a cone. The paper is carefully written and well worthy of perusal.—*Archives of Otology*, 1892.

NECROLOGY.

DR. THOMAS GODRICH, of Gravesend, New York, died July 27, 1892, of diabetes. He was a native of London, a doubly qualified practitioner of that city for many years, and an occasional attendant upon the Prince of Wales' family at Sandringham. He as was also the possessor of appointments in the Royal Volunteers, in the Humane Society, in the Fulham Health Office, in asonic relief, public vaccination and the Abbey Wood Infirmary, in the south-western part of London. He came to this country in 1885, and was in his fifty-fifth year at the time of his death.

DR. PHILLIP MARKBREITER, of Vienna, died July 20. In 1860, he founded the *Midizinal Halle*, which more recently received the title of *Wiener Medizinische Presse*. He was co-editor with Schnilzler of the *Medizinisch Chirurgische Rundschau*. About 1870, he withdrew from these and some other journals that knew more or less of his editorial work during many years.

DR. ANTOINE RUPPANER, a former member of the Association, resident at Boston and New York, died August 2 at Pittsburgh. He was a native of Switzerland, having been born there about the year 1825. Professor Agassiz, of Cambridge, was interested in young Ruppaner and through his instrumentality took the Harvard medical degree in 1858. He began practice in Boston, adopting laryngology as his specialty, being among the pioneer specialists of Boston. About 1866 he removed to New York, locating for office practice at the fifth Avenue Hotel. Latterly he removed to the Hoffman House. His offices were replete with objects of art, finely bound books and choice curios. He was a bachelor and without heir of near kin, although leaving an estate valued at over half a million. His contributions to the journals were among the first of their kind in this country; and in 1868 he published a small handbook on laryngology and rhinoscopy on diseases of the throat and nasal passages. This latter was probably the first brochure, indigenous in this country, at a time when even the term rhinoscopy had a strange and uncertain sound to American ears.

MISCELLANY.

MEDICAL SOCIETY OF THE MISSOURI VALLEY.—The annual meeting of this Society will be held at Council Bluffs, Iowa, September 15, commencing at 9 A.M. and continuing in session one day. Titles of papers should be sent prior to September 1, so they can appear on printed program mailed members at that date. F. S. THOMAS, M.D, Sec'y.

DR. W. THORNTON PARKER has accepted the invitation of the Faculty of the College of Physicians and Surgeons, Chicago, to deliver the course of lectures on Medical Jurisprudence during the approaching Session, 1892-3.

OFFICIAL LIST OF CHANGES in the Stations and Duties of Officers Serving in the Medical Department, U. S. Army, from August 6, 1892, to August 12, 1892.

Col. Charles T. Alexander, Asst. Surgeon-General U. S. A., is granted leave of absence for twenty-one days, to take effect upon the completion of the bond of Capt. Harry O. Perley, Asst. Surgeon U. S. A.

Col. Charles Page, Asst. Surgeon-General U. S. A., leave of absence granted is extended one month.

Capt. William C. Gorgas, Asst. Surgeon U. S. A., extension of the leave of absence granted is further extended twenty days.

Major Charles Smart, Asst. Surgeon U. S. A., is granted leave of absence for four months.